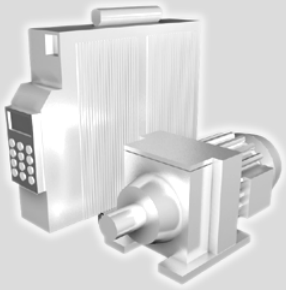
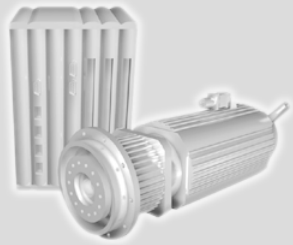
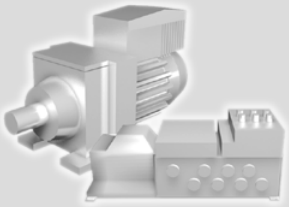
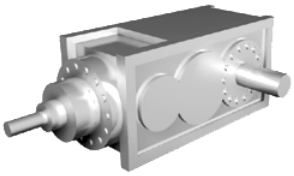
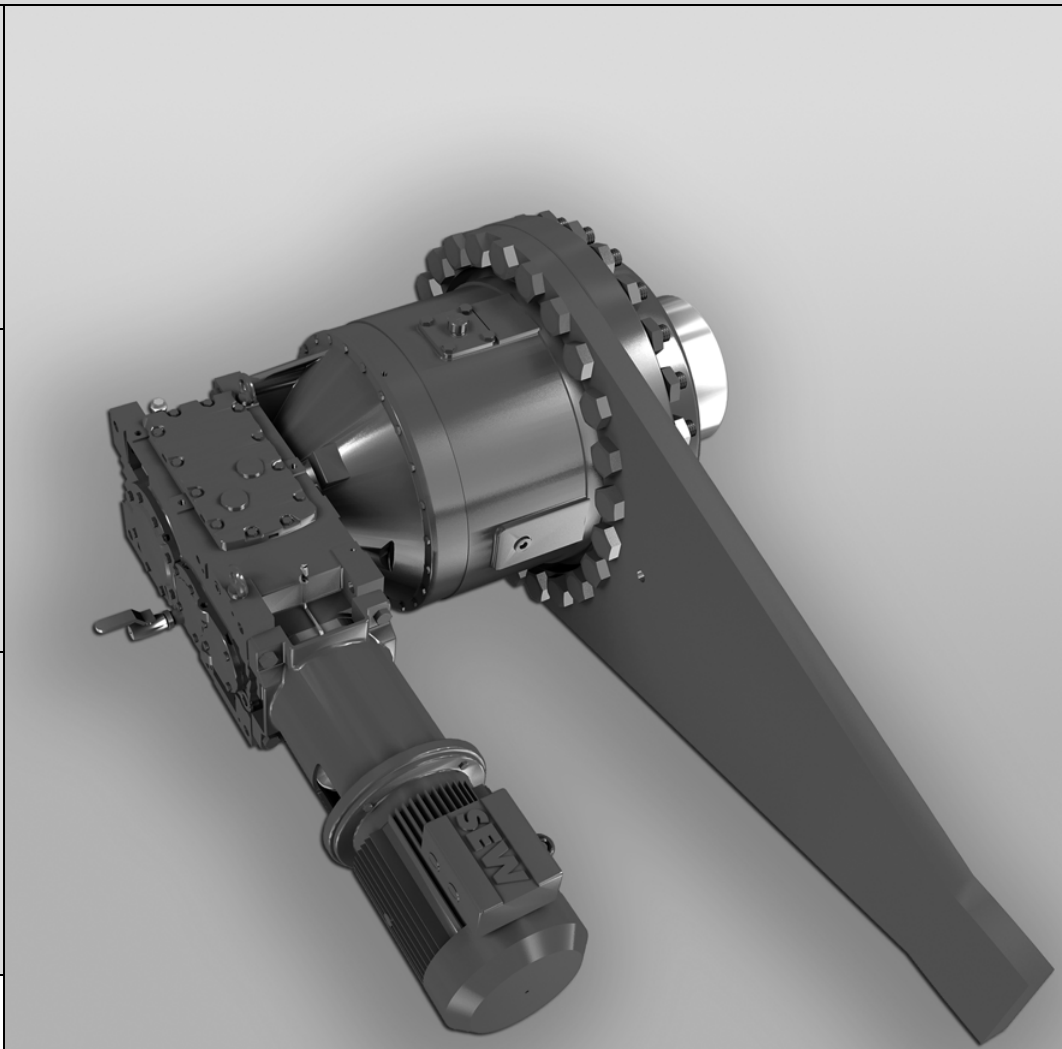
SEW EURODRIVE









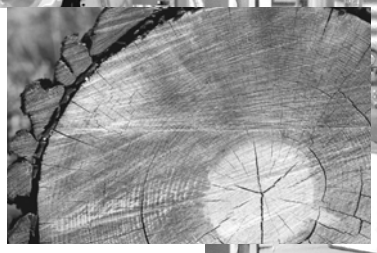


P.MC.. Industrial Gear Unit Series

Edition 06/2007

11645814 / EN

Operating Instructions



SEW EURODRIVE

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1 Important Notes

Introduction

Adhering to the operating instructions is a prerequisite for fault-free operation and the fulfillment of any right to claim under warranty. Read the operating instructions before you start working with the unit.

Make sure that the operating instructions are available to persons responsible for the system and its operation, as well as to persons who work independently on the unit.

Also observe other technical documents, delivery contracts or other agreements.

General information

P.MC.. industrial gear units are a combination of

1. P.. planetary gear units output stage
2. MC.R.. or MC.P.. primary gear unit
3. Motor, coupling, adapter and backstop, if required.

Designated use

The designated use refers to the procedure specified in the operating instructions.

The P.MC.. industrial gear units are units run by motors for industrial and commercial systems. Gear unit utilizations other than those specified and areas of application other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

In compliance with the EC Machinery Directive 2006/42/EC, the P.MC.. industrial gear units are components for installation in machinery and systems. In the scope of the EC directive, you must not take the machinery into operation in the designated fashion until you have established that the end product complies with the Machinery Directive 2006/42/EC.

Qualified personnel

P.MC.. series industrial gear units represent a potential hazard for persons and material. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the

- Assembly
- Installation
- Startup
- Operation
- Maintenance
- Servicing

of the product.

The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the P.MC.. gear unit series and to achieve the specified product characteristics and performance requirements.

SEW-EURODRIVE GmbH & Co KG assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

Product names and trademarks

The brands and product names in these operating instructions are trademarks or registered trademarks of the titleholders.

Disposal

(Please follow the latest regulations):

- Housing parts, gears, shafts and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no special collection.
- Collect waste oil and dispose of it according to the regulations in force.

1.1 Explanation of symbols

The operating instructions contain important information that deals with general and operational safety. This information is emphasized in particular with the following symbols.

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the drive and the environment.

Tips and useful information.

1.2 Operating notes

- **The nameplate of the gear unit contains the most important technical data.**
- **The two gear units have a common oil compartment!**
- **The industrial gear units of the P.MC.. series are delivered without oil fill.**
- **The mounting position may only be changed after consultation with SEW-EURODRIVE. The warranty will become void without prior consultation. When changing to a vertical mounting position of the MC.. gear unit (M2, M4), oil compensator or oil riser pipe are required. Adjust the lubricant fill volume and position of the breather valve accordingly.**
- **Observe the instructions in the "Mechanical installation" / "Installing the gear unit" section.**

2 Safety Notes

2.1 Introduction

- **The following safety notes are concerned with the use of industrial gear units of the P.MC.. series.**
- **Please also take account of the supplementary safety notes in the individual sections of these operating instructions.**

2.2 General information

Burns hazard!

Touching the gear unit when it has not been cooled will result in burns. The gear unit can have a surface temperature of more than 100 °C.

Never touch the gear unit during operation or in the cool down phase once the unit has been switched off.

Never install damaged products or take them into operation.

Submit a complaint to the shipping company immediately in the event of damage.

During or after operation, industrial gear units and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Installation / assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit
- System-specific regulations and requirements
- National/regional regulations governing safety and the prevention of accidents

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection cover or housing

Startup / operation

- **Check that the direction of rotation is correct in decoupled condition. Pay attention to unusual grinding noises as the shaft rotates.**
- Secure the keys without output elements for the test run.
- Do not deactivate monitoring and protection equipment during the test run.
- When in doubt, switch off the main motor whenever changes occur in relation to normal operation (such as increased temperatures, noise, oscillation). Determine the cause of the fault and consult SEW-EURODRIVE.
- Work carefully and keep safety in mind.
- Work on the gear unit and additional equipment only when the machine is not in use. Prevent the drive unit from being accidentally switched on by locking the keyswitch or removing the fuses from the power supply. Attach an information sign near the ON switch to warn that the gear unit is being worked on.
- Observe the notes attached to the gear unit, such as the nameplate and direction arrow. They must be free of paint and dirt. Replace missing signs.
- When installing the gear unit in devices or systems, the manufacturers of the device or system are obliged to include the regulations, notes, and descriptions from these operating instructions in their own operating instructions.
- Purchase spare parts from SEW-EURODRIVE.

Inspection / maintenance

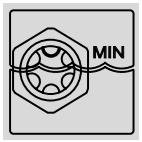
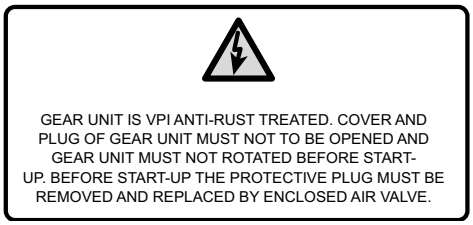
Refer to the instructions in Sec. "Inspection and Maintenance."

Operational environment

- **The gear unit is not suited for operation in potentially explosive atmospheres!**
- **Follow the specifications regarding contract-specific ambient temperature ratings and ambient conditions. Modifications require prior approval by SEW-EURODRIVE.**

2.3 Symbols on the gear unit

The symbols on the gear unit must be observed. They have the following meaning:

Symbol	Meaning
	Breather valve
	Oil filling plug
	Oil drain plug
	Lubrication point
	**Oil sight glass**
	Direction of rotation
	Delivery state
	Hot surfaces
	**Extended storage**

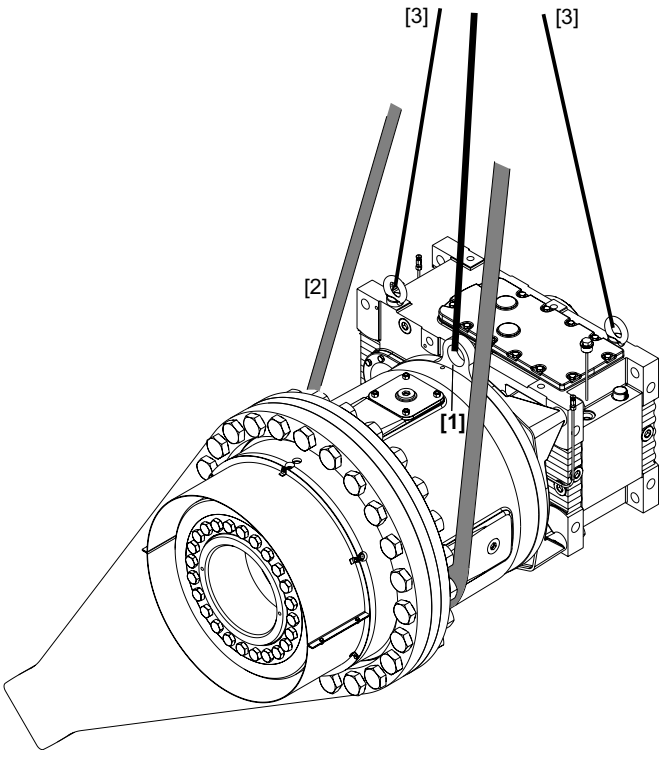
2.4 Transport

General information

- **Inspect the shipment for any damage in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.**
- **Stay away from beneath the gear unit during transport.**
- **Secure the danger zone.**
- **During transport, use only hoists and load-bearing equipment with sufficient load-bearing capacity.**
- **The weight of the gear unit is indicated on the nameplate or the dimension sheet. Observe the loads and regulations specified on the nameplate.**
- **The gear unit must be transported in a manner that prevents injuries and damage to the gear unit. For example, impacts against exposed shaft ends can damage the gear unit.**
- **Do not use the eyebolts on motors, auxiliary gear units or primary gear units during transport of the assembled drive unit (see next page).**
- **Use suitable, sufficiently rated handling equipment if necessary. Before startup, remove securing devices used for transport.**

Transporting gear units without motor

Gear units may only be transported using lifting straps, cables or chains. Make sure that the load of the gear unit is distributed appropriately. The main load must be carried by the transport eye [1] and lifting strap [2] of the P.. gear unit. The lifting chain [3[at the lifting eyebolts of the MC gear unit is for balancing during transport.



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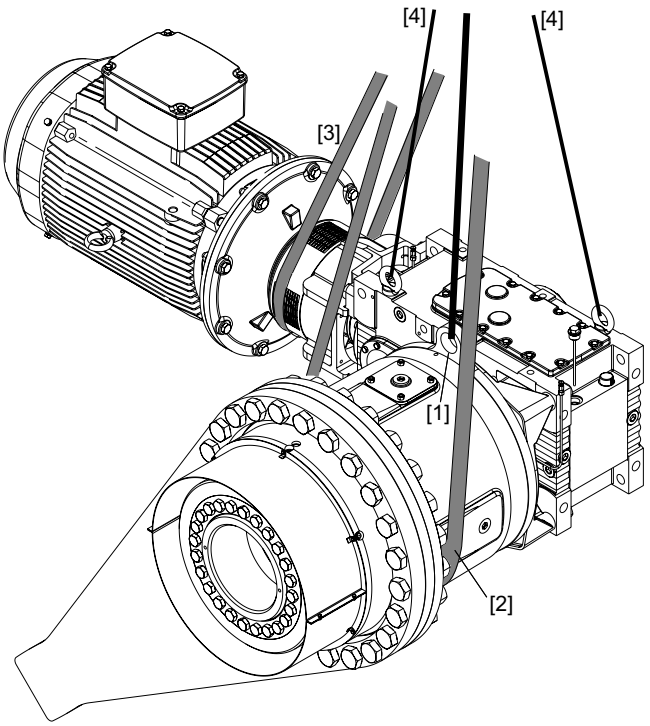
Transporting gear units with motor adapter

Gear units may only be transported using lifting straps, cables or chains. Make sure that the load of the gear unit and the motor is distributed appropriately. The main load must be carried by the transport eye [1] and lifting strap [2] of the P.. gear unit. The lifting strap [3] at the motor adapter and the lifting chain [4] at the lifting eyebolts of the MC gear unit is for balancing during transport.



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2.5 Corrosion and surface protection

The information in this section apply only to P.MC.. series industrial gear units assembled in Europe. Other paint systems might be used in other regions. Please consult the SEW-EURODRIVE assembly plant for P.MC.. industrial gear units at your location.

Introduction

The corrosion and surface protection of gear units comprises the following three basic features:

1. Painting system
   - Standard painting system K7 E160/2
   - High-resistant painting system K7 E260/3 as option
2. Gear unit corrosion protection with
   - interior protection and
   - exterior protection
3. Gear unit packing
   - Standard packing (pallet)
   - Wooden box
   - Seaworthy packaging

Standard painting system K7 E160/2

Painting according to TEKNOS EPOXY SYSTEM K7 based on the high-solid epoxy paint TEKNOPLAST HS 150.

Two-layer system K7 E 160/2	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	100 µm
Total thickness	**160 µm**

Color shade: RAL 7031, blue gray

Protective covers

Powder coating, epoxy-based coat paint (EP) is used for guards and shields.

Layer thickness: 65 µm

Color shade: TM 1310 PK, warning in yellow color

High-resistant painting system K7 E 260/3

Painting according to TEKNOS EPOXY SYSTEM K7 based on the high-solid epoxy paint TEKNOPLAST HS 150.

Three-layer system, K7 E 260/3	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	2x100 µm
Total thickness	**260 µm**

Optional color shade

Other color shades are available on request.

Using the painting system

Environmental pollution	None	Low	Medium	High	Very high
Typical environmental conditions		Unheated buildings where condensation can build up. Atmospheres with low pollution. Mostly rural areas.	Production halls with high humidity levels and low air contamination. City and industrial atmospheres, moderate contamination with sulphur dioxide. Coastal areas with low salt load.	Industrial areas and coastal areas with moderate salt load. Chemical plants	Buildings or areas with almost permanent condensation and high levels of contamination. Industrial areas with very high levels of moisture and aggressive atmospheres.
Installation	Indoors	Indoors	Indoors or outdoors	Indoors or outdoors	Indoors or outdoors
Relative humidity	< 90 %	Up to 95 %	Up to 100 %	Up to 100 %	Up to 100 %
Recommended painting system	Standard painting system K7 E160/2	Standard painting system K7 E160/2	Standard painting system K7 E160/2	High resistant painting system K7 E260/3	Consult SEW-EURODRIVE

Storage and transport conditions

Industrial gear units of the P.MC.. series are delivered without oil fill. Different protection systems are required depending on storage period and ambient conditions:

Storage period: Up to … months	Storage conditions Gear unit corrosion protection				Transport conditions Gear unit packaging	
	OUTDOORS, roofed	INDOORS, heated (0…+20°C)	Storage OUTDOORS close to the sea, roofed	Storage close to the sea INDOORS	Land transport	Sea transport
6	Standard protection	Standard protection	Consult SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
12	Consult SEW-EURODRIVE	Standard protection	Consult SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
24	Long-term protection	Consult SEW-EURODRIVE	Consult SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
36	Consult SEW-EURODRIVE	Long-term protection	Consult SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging

Standard protection / interior

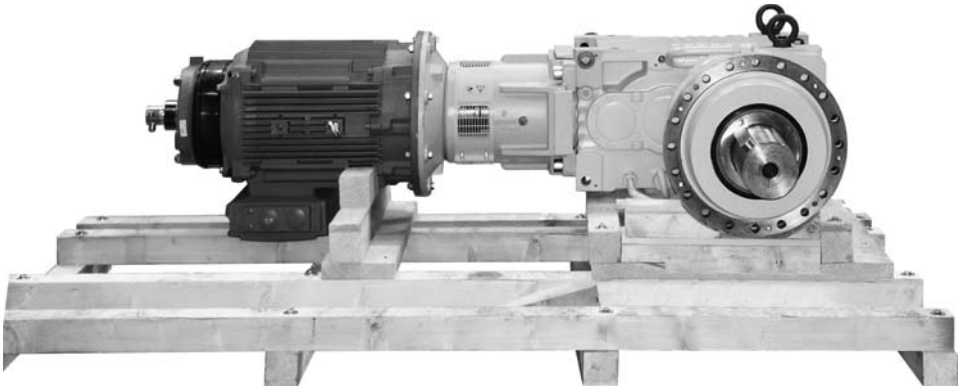
- Gear units undergo a test run with protection oil. The protection oil is drained by SEW-EURODRIVE before dispatch. The remaining layer of protection oil on the inner parts serves as basic protection.

Standard protection / exterior

- Oil seals and seal surfaces are protected by suitable bearing grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Remove the coating using a solvent before mounting other equipment onto the surface.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protection plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- The breather plug (position → see order documents) is already installed at the factory.

Standard protection / packaging

Standard packaging is used: The gear unit is delivered on a pallet without cover.



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Long-term protection / interior

Internal gear unit protection in addition to the "standard protection":

- A VPI solvent is sprayed through the oil filling hole.
- **Never open the gear unit near open flames, sparks and hot objects because the solvent vapors might be ignited.**
- **Take preventive measures to protect people from the solvent vapors. Make sure that open flames are avoided when the solvent is applied and when it evaporates.**
- **The output shaft must be rotated by at least one turn so that the position of the roller elements in the bearings of LSS and HSS changes. This procedure has to be repeated every 6 months until startup.**
- **The interior long-term protection with the VPI solvent has to be repeated every 24 / 36 months until startup (according to the table "Storage and transport conditions")**.

Long-term protection / exterior

- **If the gear unit is stored longer than 6 months, it is recommended to regularly check the protective coating of unpainted areas as well as the paint coat. Areas with removed protection coating or paint have to be repainted, if necessary.**
- Oil seals and sealing surfaces are protected by suitable grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Remove the coating using a solvent before mounting other equipment onto the surface.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protection plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- The breather plug (position → see order documents) is already installed at the factory.
- The breather plug is replaced by a screw plug. You find the position of the breather plug in the order documents. Prior to startup, the screw plug must be replaced again by the breather plug. The breather plug is attached to the gear unit separately.

Seaworthy packaging

- Seaworthy packaging is used: The gear unit is packaged in a seaworthy plywood box and is delivered on a pallet.

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Alternative packaging

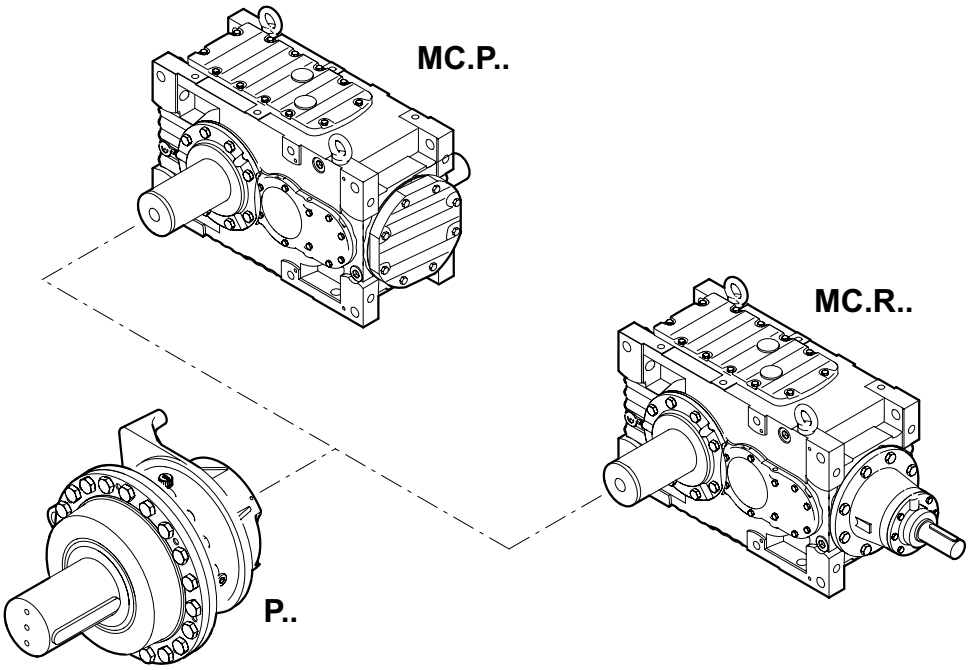
Optionally, the gear unit can be supplied in a wooden box with standard gear unit protection.

3 Gear Unit Design

3.1 Combination of P.. planetary gear unit with MC.. primary gear unit

The following figure shows the design of P.MC.. gear units .

The gear unit comprises a P.. planetary gear unit and an MC.P../MC.R.. primary gear unit.



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P.. = Planetary gear unit

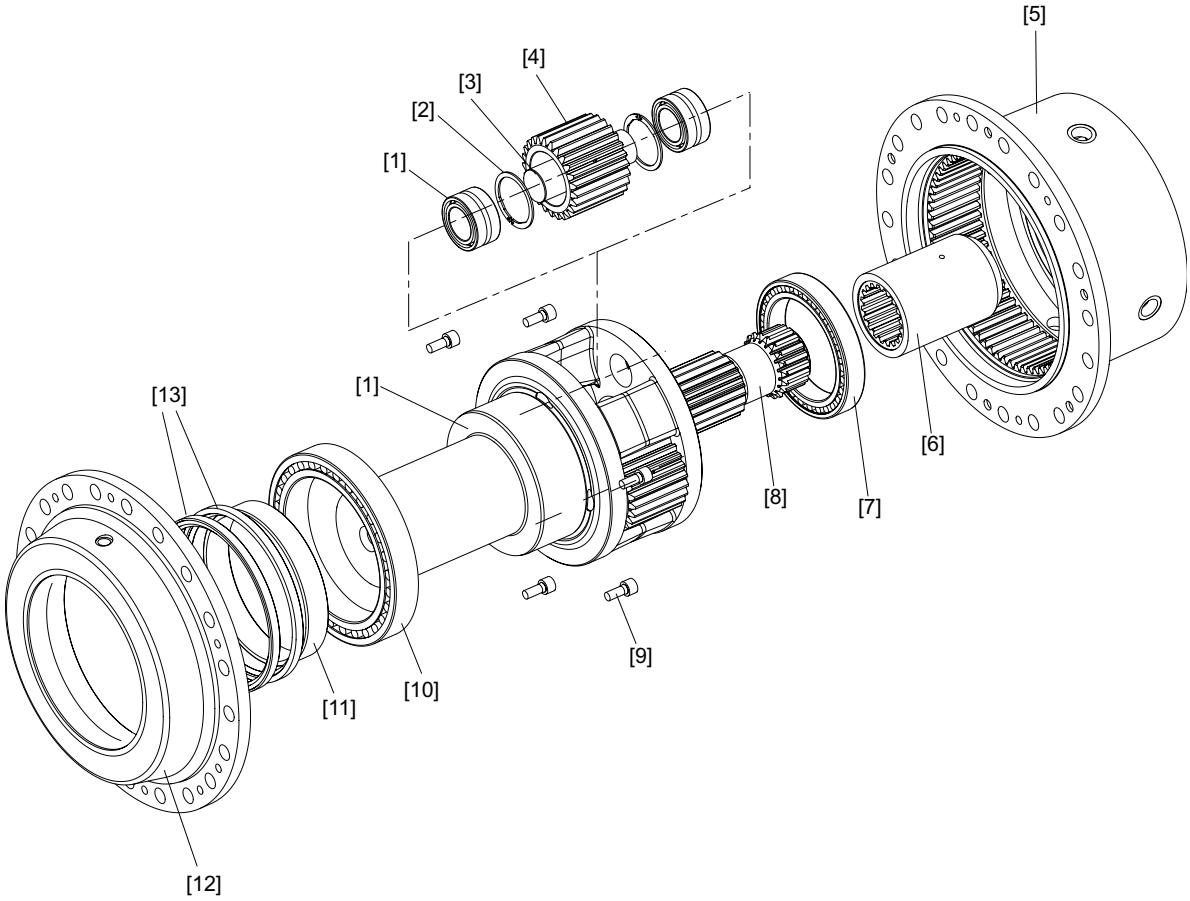
MC.P.. = Helical gear unit (primary gear unit)

MC.R.. = Bevel-helical gear unit (primary gear unit)

3.2 Design of the planetary gear unit

The following illustrations allow to easily assign components to the spare parts lists. Discrepancies are possible depending on the gear unit size and version.

P1..MC..



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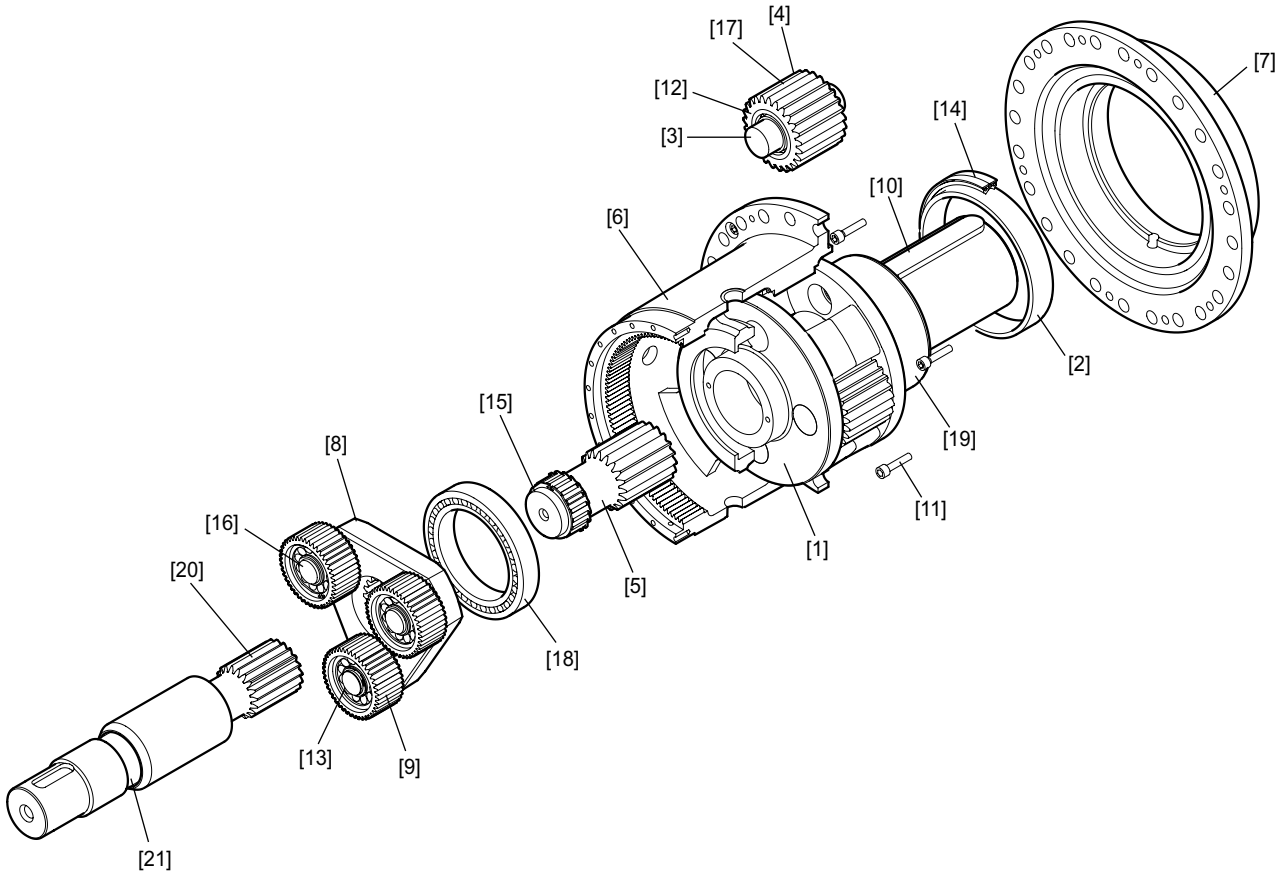
[1] Planetary bearing
[2] Circlip
[3] Planet bolt
[4] Planet wheel
[5] Housing gear rim
[6] Gear coupling
[7] Bearing
[8] Sun pinion
[9] Holding screw
[10] Bearing
[11] Bearing race
[12] Flange cover
[13] Sealing ring

P2..MC..



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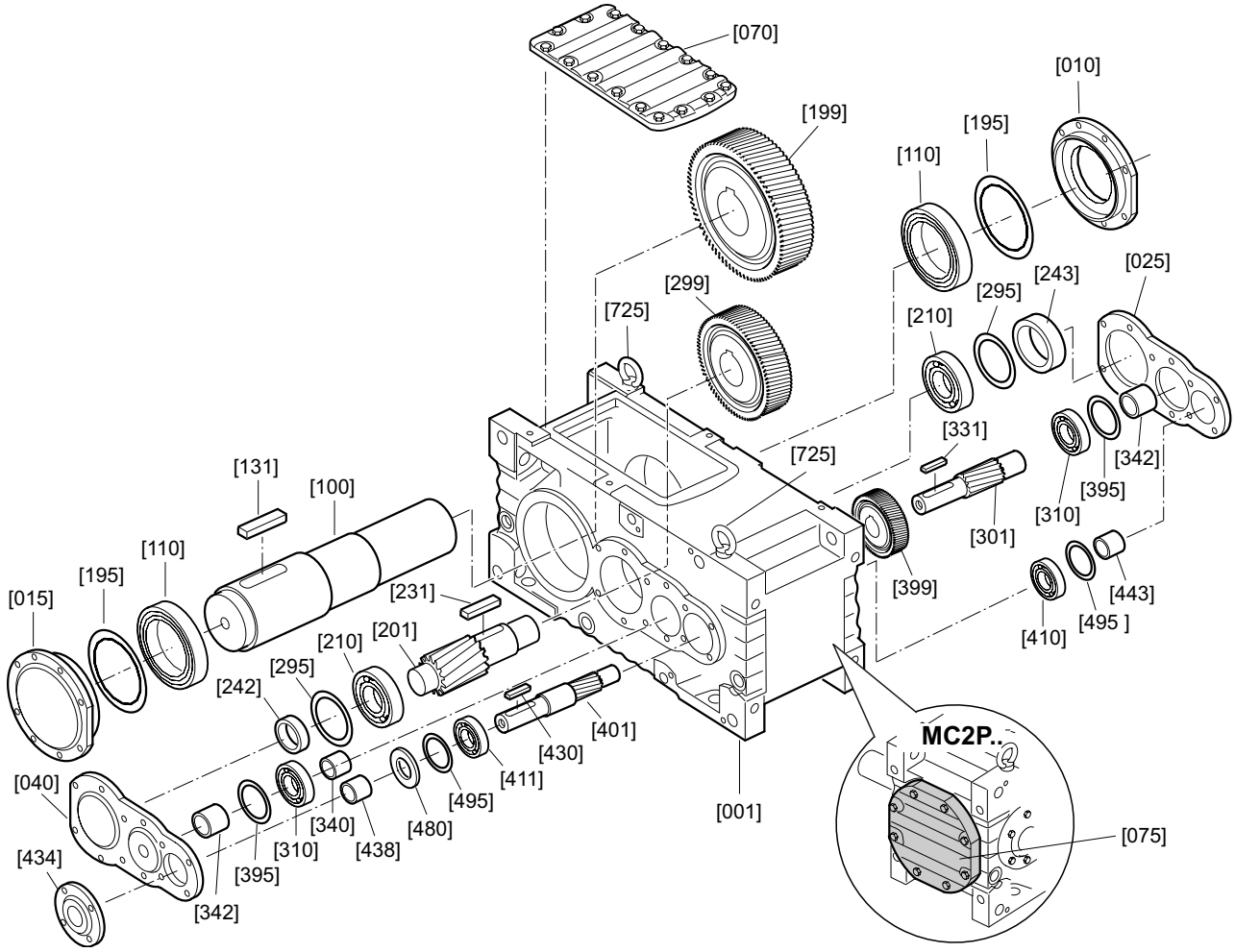
[1] Planet carrier
[2] Bearing race
[3] Planetary axle
[4] Planet wheel
[5] Sun pinion
[6] Housing gear rim
[7] Output flange
[8] Planet carrier
[9] Planet wheel
[10] Key (not with hollow shaft)
[11] Hexagon socket head cap screw
[12] Cylindrical roller bearing
[13] Self-aligning roller bearing
[14] Oil seal
[15] Circlip
[16] Circlip
[17] Circlip
[18] Cylindrical roller bearing
[19] Cylindrical roller bearing
[20] Sun pinion
[21] Intermediate shaft

3.3 Design of the MC.P.. series primary gear unit

The following illustrations allow to easily assign components to the spare parts lists. Discrepancies are possible depending on the gear unit size and version.



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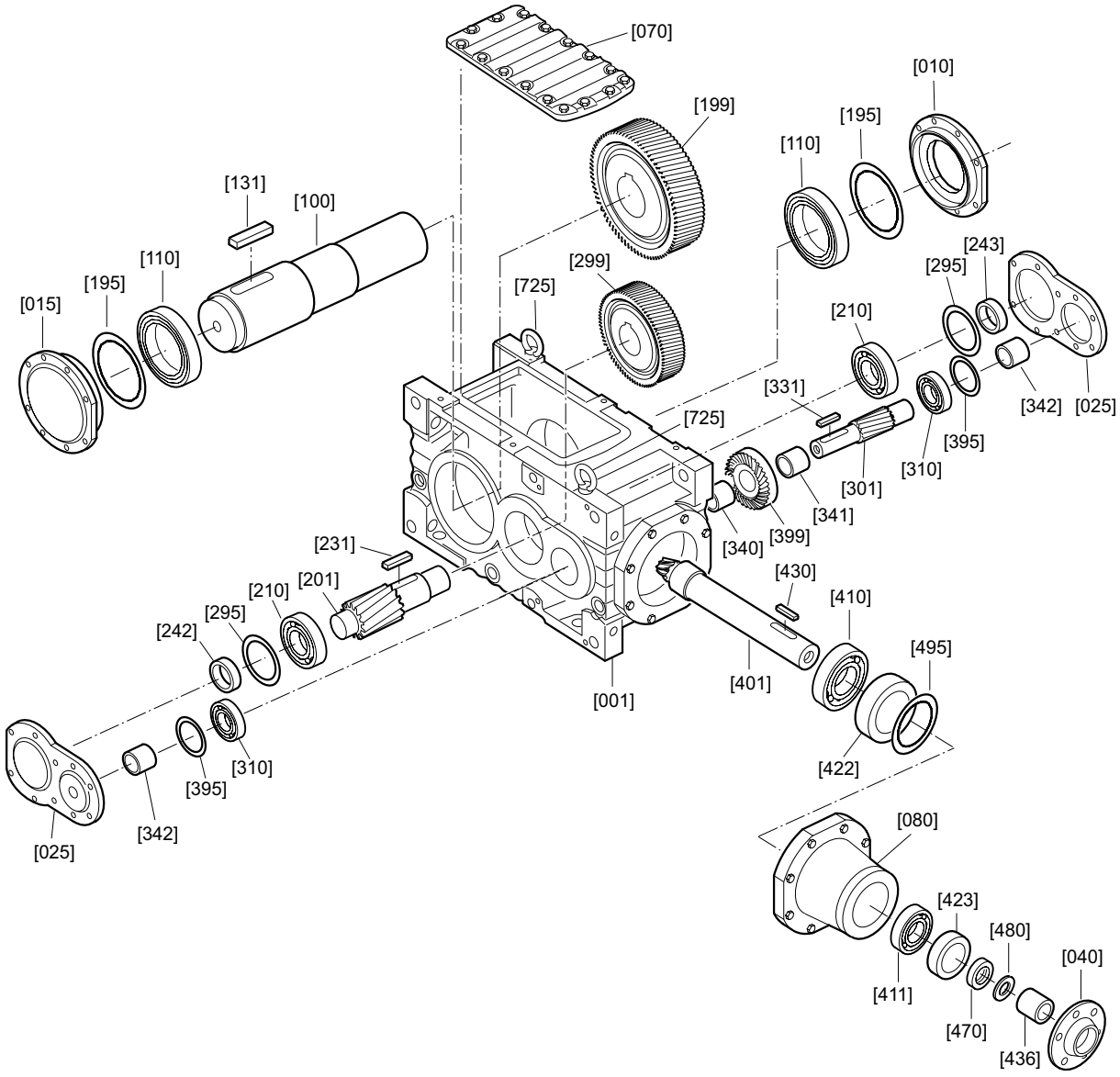
[001] Gear unit housing
[010] Bearing cover
[015] Bearing cover
[025] Bearing cover
[040] Bearing cover
[070] Gear unit cover
[075] Cover plate
[100] Output shaft
[110] Bearing
[195] Shim
[199] End gear
[201] Pinion shaft
[210] Bearing
[231] Key
[242] Spacer tube
[243] Spacer tube
[295] Shim
[299] Gear
[301] Pinion shaft
[310] Bearing
[331] Key
[340] Spacer tube
[342] Spacer tube
[395] Shim
[399] Wheel
[401] Input shaft
[410] Bearing
[411] Anti-friction bearing
[430] Key
[434] Cover
[438] Bushing
[443] Spacer sleeve
[480] Oil seal
[495] Shim
[725] Lifting eyebolt

3.4 Design of the MC.R.. series primary gear unit

The following illustration allows to easily assign components to the spare parts lists. Discrepancies are possible depending on the gear unit size and version.



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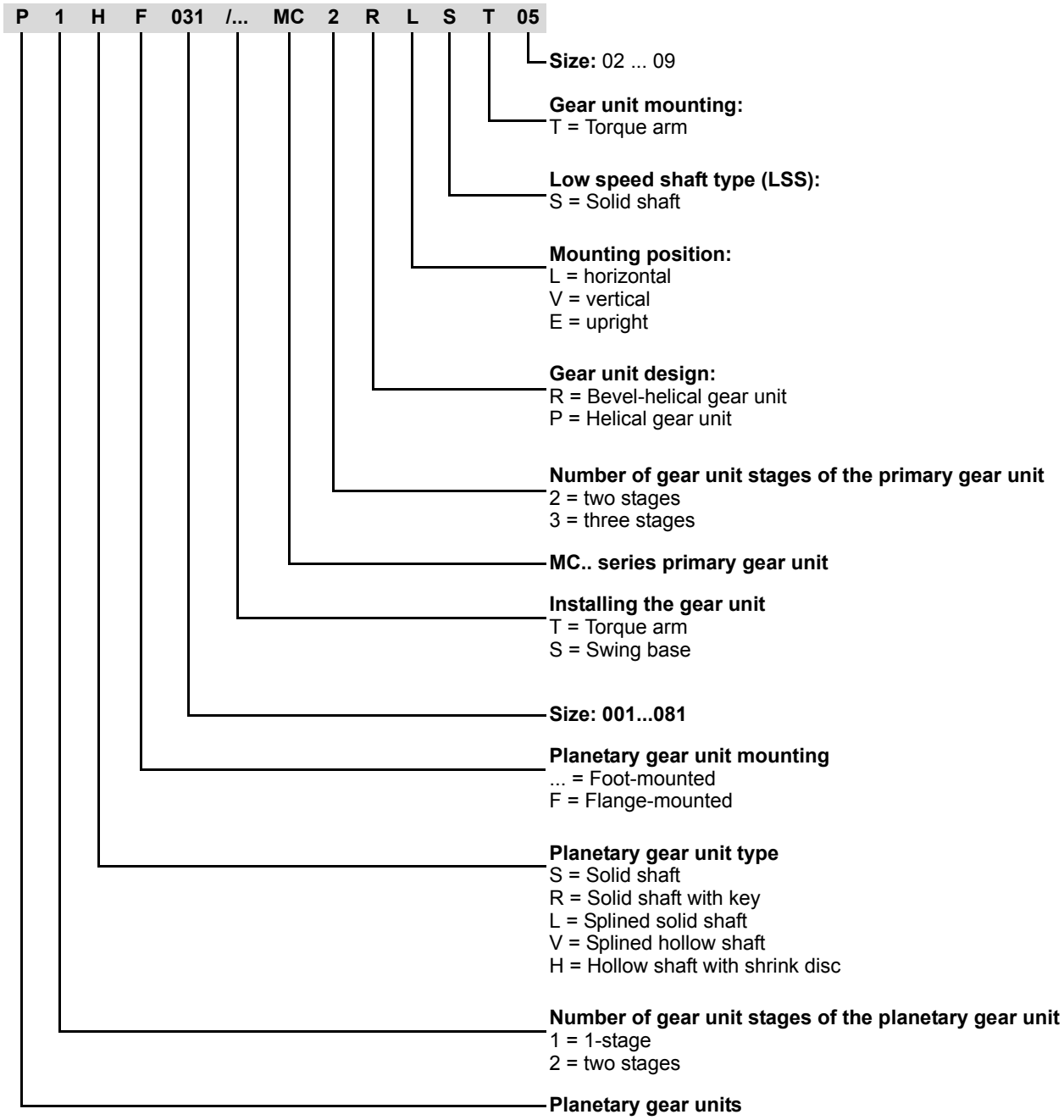
[001] Gear unit housing
[010] Bearing cover
[015] Bearing cover
[025] Bearing cover
[040] Cover
[070] Gear unit cover
[080] Bearing cover
[100] Output shaft
[110] Bearing
[131] Key
[195] Shim
[199] End gear
[201] Pinion shaft
[210] Bearing
[231] Key
[242] Spacer tube
[243] Spacer tube
[295] Shim
[299] Gear
[301] Pinion shaft
[310] Bearing
[331] Key
[340] Spacer tube
[341] Spacer tube
[342] Spacer tube
[395] Shim
[399] Bevel gear
[401] Bevel pinion shaft
[410] Bearing
[411] Bearing
[422] Bearing bushing
[423] Bearing bushing
[430] Key
[436] Bushing
[470] Clamping nut
[480] Oil seal
[495] Shim
[725] Lifting eyebolt

3.5 Unit designation, nameplates

Sample unit designation


P 1 H F 031 /... MC 2 R L S T 05
Size: 02 ... 09
Gear unit mounting:
T = Torque arm
Low speed shaft type (LSS):
S = Solid shaft
Mounting position:
L = horizontal
V = vertical
E = upright
Gear unit design:
R = Bevel-helical gear unit
P = Helical gear unit
Number of gear unit stages of the primary gear unit
2 = two stages
3 = three stages
MC.. series primary gear unit
Installing the gear unit
T = Torque arm
S = Swing base
Size: 001...081
Planetary gear unit mounting
... = Foot-mounted
F = Flange-mounted
Planetary gear unit type
S = Solid shaft
R = Solid shaft with key
L = Splined solid shaft
V = Splined hollow shaft
H = Hollow shaft with shrink disc
Number of gear unit stages of the planetary gear unit
1 = 1-stage
2 = two stages
Planetary gear units

Example nameplate

SEW-EURODRIVE Bruchsal / Germany

Type	P061						
Nr. 1	01.1119651601.0001.05			Nr. 2	W10527		
		norm.	min.	max.	i	1 :	39.23
PK1	[kW]	12.7	2.3	15.8	FS		2.5
MK2	[kNm]	75.4	75.4	75.4	FR1	[kN]	0
n1	[1/min]	62	11.7	78.5	FR2	[kN]	0
n2	[1/min]	1.6	0.3	2.0	FA1	[kN]	0
Operation instructions have to be observed!					FA2	[kN]	0
Made by		SEW			Mass	[kg]	1770
Qty of greasing points	0	Fans	0				
Lubricant	Synthetic ISO VG 460 EPPAO - 25 ltr.				Year		2007
FSA GmbH EUCode0588 // IM: M1-F1 // Tu = 0 ... 40 °C							

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Type		Unit designation
No. 1		Serial number 1
No. 2		Serial number 2
P_{K1}	[kW]	Gear unit force
M_{K2}	[kNm]	Gear unit output torque
n_1	[1/min]	Input speed (HSS)
n_2	[1/min]	Output speed (LSS)
norm.		Standard operating point
min.		Operating point at minimum speed
max		Operating point at maximum speed
i		Exact gear unit reduction ratio
F_S		Service factor
F_{R1}	[kN]	Actual overhung load acting on the drive shaft
F_{R2}	[kN]	Actual overhung load acting on the output shaft
F_{A1}	[kN]	Actual axial load acting on the drive shaft
F_{A2}	[kN]	Actual axial load acting on the output shaft
Mass	[kg]	Weight of the gear unit
Number of greasing points		Number of points that require regreasing
Fans		Number of installed fans
Lubricant		Oil grade and viscosity class / oil volume
Year		Year of construction
IM		Mounting position: Housing orientation and mounting surface variants
Tu		Permitted ambient temperature

3.6 Mounting positions

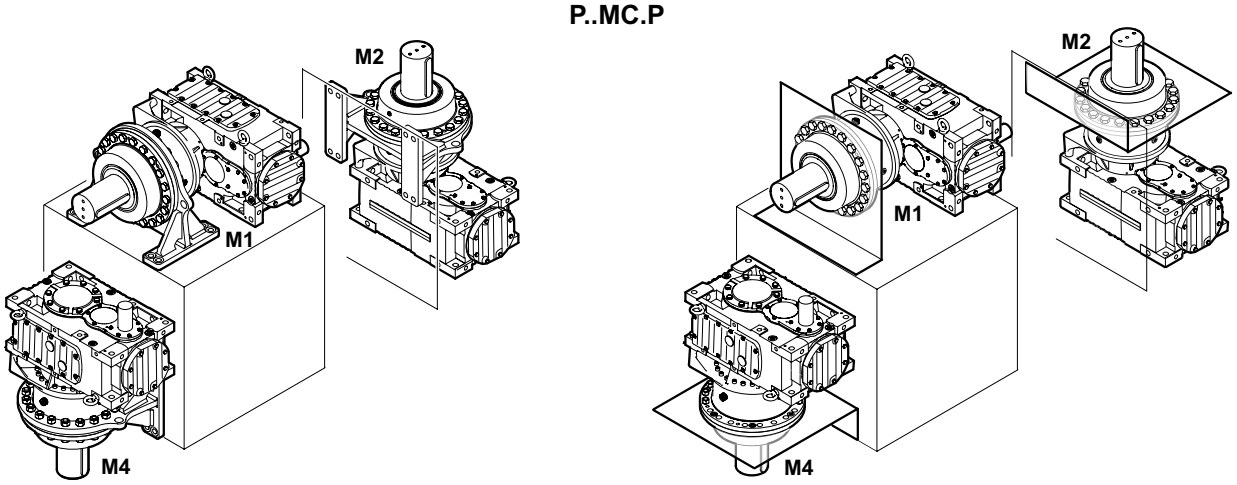
Mounting position designations

SEW-EURODRIVE differentiates between mounting positions M1, M2 and M4. The following figure shows the spatial orientation of the gear unit.

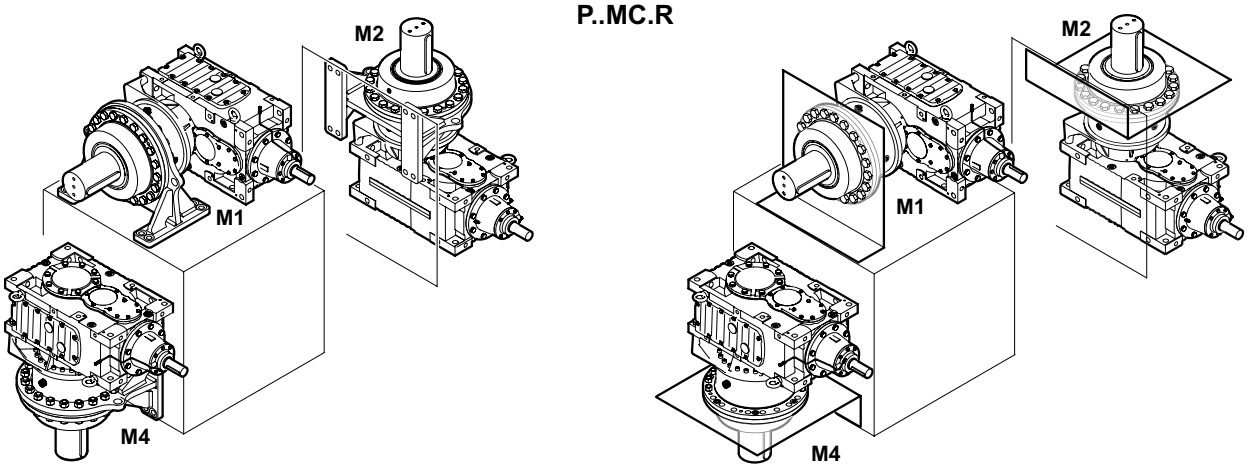
The mounting positions apply to planetary gear units with solid shafts and hollows shafts.

For a different position of the primary gear unit, see order documents.

P..MC.P



P..MC.R



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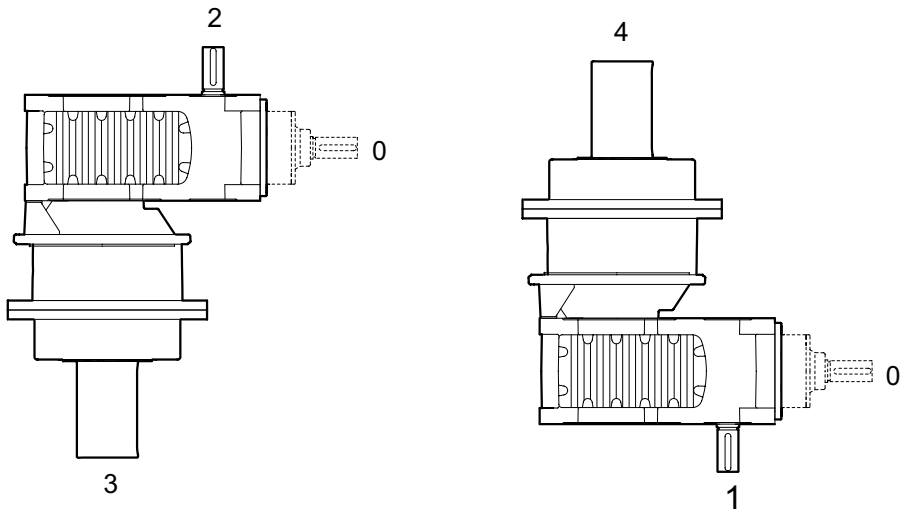
3.7 Shaft position

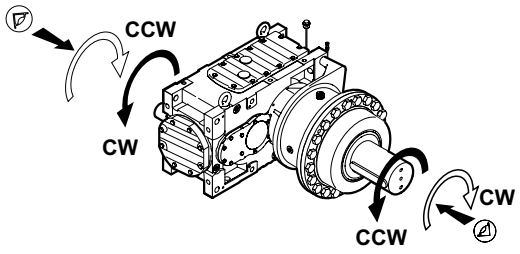
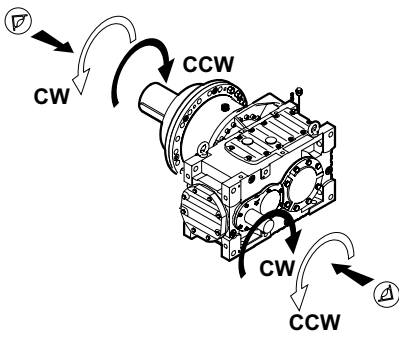
The following figure shows the shaft position (0, 1, 2, 3, 4).



3.8 Direction of rotation

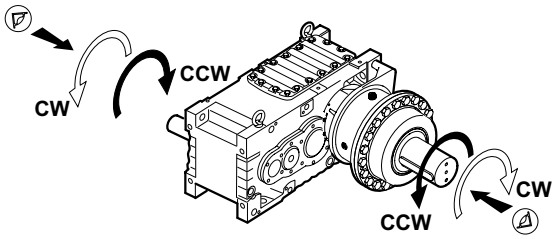
Shaft positions and directions of rotation P.MC2P..

The following figures show shaft positions and corresponding directions of rotation for P.MC2P.. series industrial gear units.

2-stage primary gear unit
Shaft position 1-4

Shaft position 2-3


Shaft positions and corresponding directions of rotation of P.MC3P..

The following figures show shaft positions and corresponding directions of rotation for P.MC3P.. series industrial gear units.

3-stage primary gear unit
Shaft position 1-4

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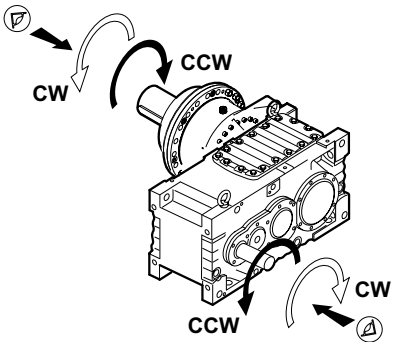
Shaft position 2-3

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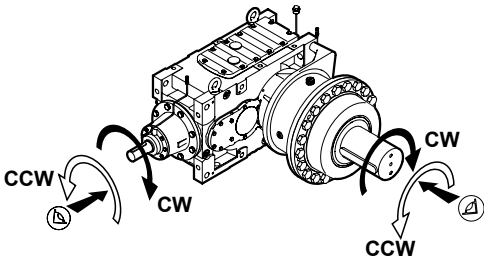
Shaft positions and corresponding directions of rotation of P.MC.R.. without backstop

The following figures show shaft positions and corresponding directions of rotation for two and three stage P.MC.R.. series industrial gear units without backstop.

Two and three stages primary gear units
Shaft position 0-4

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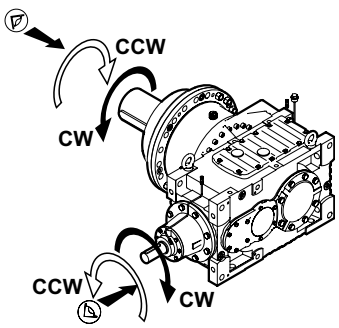
Shaft position 0-4

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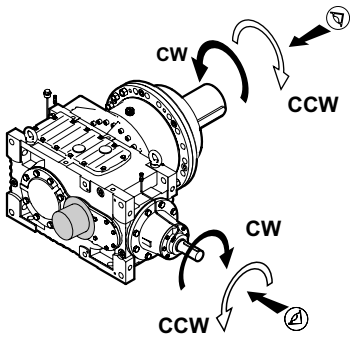
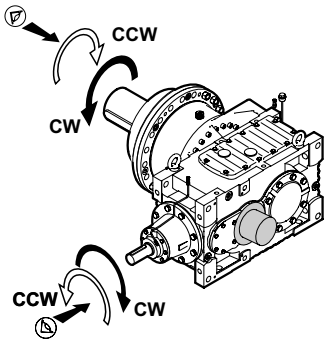
Shaft positions and corresponding directions of rotation of P.MC2RS.. / P.MC2RH.. keyway with backstop

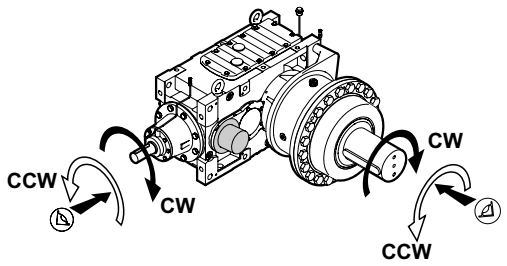
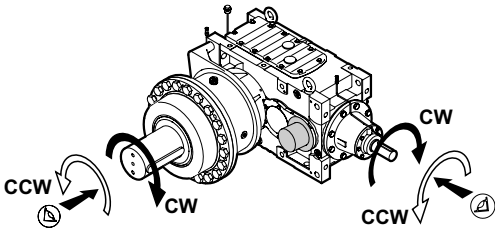
The following figures show shaft positions and directions of rotation for two-stage gear units with backstop of the types P.MC.RS..and P.MC.RH.. with keyway.

2-stage primary gear unit
Shaft position 0-4    58009AXX
Shaft position 0-3    58011AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

Shaft positions and corresponding direction of rotation for P.MC3R.. with backstop on driven machine end

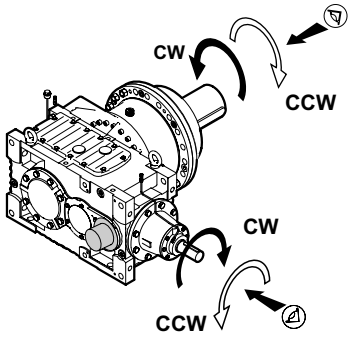
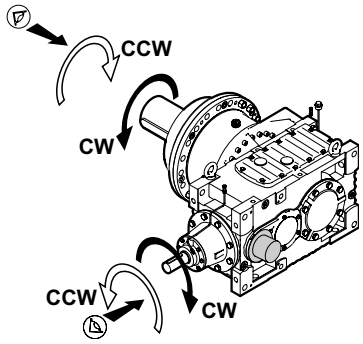
The following figures show the shaft positions and direction of rotation dependencies for 3-stage gear units with backstop of type P.MC.3R..

3-stage primary gear unit
Shaft position 0-4    58012AXX
Shaft position 0-3    55956AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

Shaft positions and corresponding directions of rotation of P.MC3R.. Backstop opposite driven machine

The following figures show the shaft positions and corresponding directions of rotation for gear units with backstop P.MC3R.

3-stage primary gear unit
Shaft position 0-4    58014AXX
Shaft position 0-3    58015AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

Splash lubrication

With splash lubrication, the oil level is low. With this lubrication method, oil is splashed onto the bearings and gearing components.

Oil bath lubrication

With oil bath lubrication, the oil level is so high that the bearings and gearing components are completely immersed in the lubricant.

Oil expansion tanks can **always be used with bath lubrication**. Oil expansion tanks allow the lubricant to expand when the gear unit heats up during operation.

Symbols used

The following table shows the symbols used in the order documents. Refer to the order documents for the mounting positions of the gear units.

Symbol	Meaning
	Breather plug
	Air outlet screw
	Inspection opening
	Oil filling plug
	Oil drain plug
	Dipstick
	Oil sight glass

4 Installation / Assembly

4.1 Required tools / aids

Not included in the scope of delivery:

- Set of wrenches
- Torque wrench (for shrink discs)
- Motor mount on motor adapter
- Mounting device
- Compensation elements (shims, spacing rings)
- Fixing devices for input and output elements
- Mount the parts according to the gear unit illustrations shown in the "Gear unit foundation" section.

4.2 Installation tolerances

	shaft end	Flanges
Primary gear unit MC..	Diameter tolerance > 50 mm -> ISO m6 Center hole in accordance with DIN 332, shape D.. d, d1 > 85.0.130 mm -> M24 > 130..180 mm -> M30 > 180 mm -> -	Centering shoulder tolerance -> ISO m8
P.. planetary gear units	Shaft end ISO m6	Centering shoulder ISO f8

4.3 Prerequisites for assembly

Ensure that the following conditions have been met:

- The entries on the nameplate of the gearmotor match the voltage supply system.
- The drive has not been damaged during transportation or storage.
- Ambient temperature according to the nameplate.
- The drive must not be assembled in the following ambient conditions:
  - Potentially explosive area
  - Oils
  - Acids
  - Gases
  - Vapors
  - Radiation

4.4 Preliminary work

Clean the shaft

Ensure sufficient ventilation when using solvents. There is a risk of explosion. No open flames.

Risk of material damage.

Do not let the solvent come into contact with the sealing lips of the oil seals.

- You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent.
- Protect all oil seals against direct contact with abrasive substances (such as sand, dust, shavings).

Long-term-storage

Please note: The service life of the bearing lubricant in the bearing is reduced if the unit is stored for ≥ 1 year.

P.MC.. gear units designed for "extended storage" usually have a higher oil level (CLP PG). Adjust the oil level before startup (see Sec. "Inspection / Maintenance").

Oil check

Fill the P.MC.. gear unit with the oil grade and quantity specified on the nameplate (see Sec. 'Startup' and 'Inspection and Maintenance'):

- **Fill to volume suitable for the mounting position (see nameplate)**
- **Check oil level through oil sight glass or with oil dipstick**

→ **Sec. "Inspection and Maintenance" and "Design and Operating Notes".**

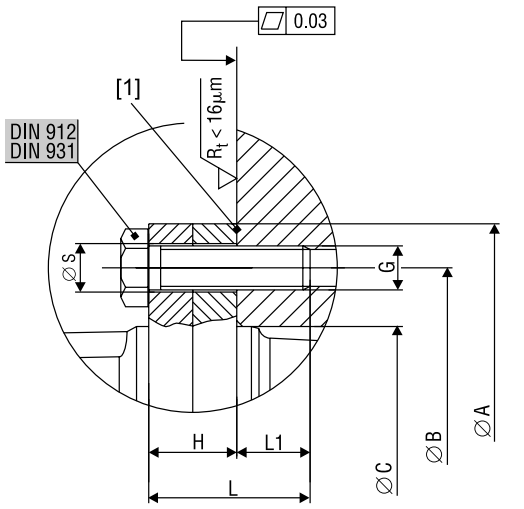
4.5 Notes on installing the gear unit

- **You must strictly observe the safety instructions in the previous sections.**
- **The most important technical data is indicated on the nameplate. Additional data relevant for operation is available in drawings, order confirmation or any order-specific documentation.**
- **The gear unit must be installed with great care by qualified personnel. Damage caused by improper handling leads to exclusion of liability.**
- **Install / mount the gear unit only in the specified mounting position on a level, vibration-damping, and torsionally rigid support structure. Do not tighten housing legs and mounting flanges against each other.**
- **Work on the gear unit only when the machine is not in use. Prevent the drive unit from starting up unintentionally (for example, by locking the keyswitch or removing the fuses from the power supply). Attach an information sign near the ON switch to warn that the gear unit is being worked on.**
- **The oil level and drain plugs as well as the breather valves must be freely accessible.**
- **Use plastic inserts (2 to 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel). Also fit the plugs with plastic washers. Ground the housing additionally - use the grounding screws on the motor.**
- **Before startup, check whether the oil fill corresponds to the specified mounting position (→ information on the nameplate).**
- **The mounting position may only be changed after consultation with SEW-EURODRIVE. Warranty will become void without prior consultation.**
- **Only authorized personnel may assemble gear head units with motors and adapters. Please contact SEW-EURODRIVE.**
- **Do not weld anywhere on the drive. Do not use the drive as a ground point for welding work. Welding may destroy gearing parts and bearings.**
- **Protect rotating drive parts, such as couplings, gears, or belt drives, using suitable devices that protect from contact.**
- **Units installed outdoors must be protected from the sun. Suitable protective devices are required, such as covers or roofs. When using these, avoid heat accumulation. The operator must ensure that foreign objects do not impair the function of the gear unit (e.g. by falling objects, or coverings).**
- **Gear units are supplied with suitable coating for use in damp areas or in the open air. Any damage to the coating (e.g. on the breather valve) must be repaired.**
- **For the standard mounting positions, the breather valve on the gear unit is mounted at the factory and activated if the gear unit is supplied without oil fill. Check the functionality of the breather valve and that it is seated correctly.**
- **Only mount the couplings using a mounting device.**

4.6 Flange mounting

During gear unit mounting on the torque arm and / or machine frame, note the following:

- Only use class 8.8 screws in accordance with the table below.
- Tighten the screws with the specified tightening torque.
- In addition, apply Loctite 640 to the screw contact surface [1].



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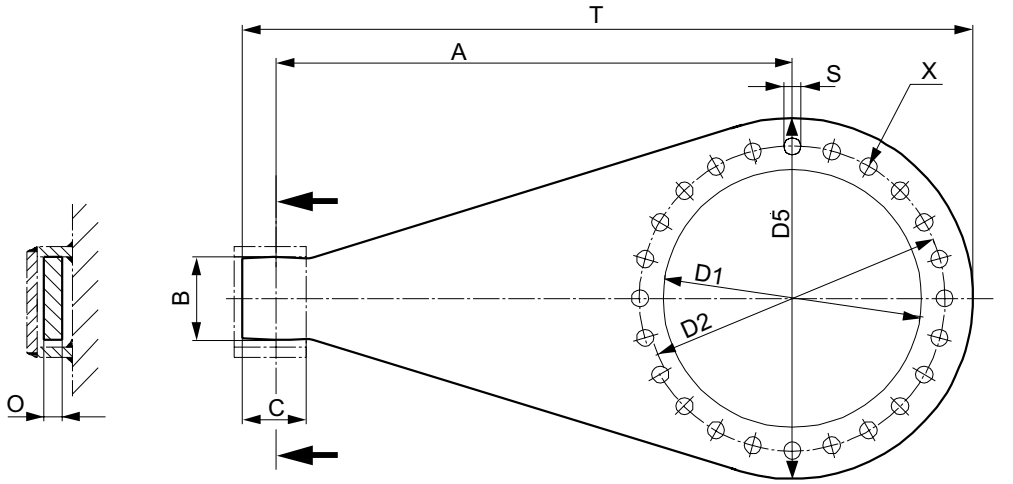
Gear unit type P	Screws DIN	Thread	Number	Strength classes	Tightening torque [Nm] ± 20 %	Dimensions in [mm] ∅ S	H	L	L1	∅ A	∅B	∅ C
P..001MC..	912/931	M20	20	8.8	310	22	36	70	34	410	370	330 f8
P..011.MC..	912/931	M20	20	8.8	310	22	38	70	32	450	410	370 f8
P..021MC..	912/931	M20	24	8.8	310	22	44	80	36	500	460	410 f8
P..031MC..	912/931	M24	20	8.8	540	26	46	80	34	560	510	460 f8
P..041MC..	912/931	M30	20	8.8	1100	33	60	110	50	620	560	480 f8
P..051MC..	912/931	M30	24	8.8	1100	33	60	110	50	650	590	530 f8
P..061MC..	912/931	M36	24	8.8	1830	39	70	130	60	760	690	610 f8
P..071MC..	912/931	M36	24	8.8	1830	39	80	140	60	840	770	690 f8
P..081MC..	912/931	M42	24	8.8	3200	45	80	150	70	920	840	750 f8

4.7 Mounting torque arms for hollow shaft gear units

Single-sided torque arm

Do not place torque arms under strain during installation.

The reactive force due to the gear unit torque is absorbed via the torque arm with lever arm A. The illustration shows an example for absorption in a welded construction with design dimensions. Two supporting plates are welded with the suggested dimensions on the machine design. Once the gear unit has been mounted, a connecting cover plate is welded onto the two supporting plates. The force of the gear unit torque acts on the support, divided by the length of the lever arm A. The reaction force also acts on the gear unit and machine shafts.



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Dimensions

Gear unit type	Dimensions in [mm]									Number	Weight
	A	B	C	D1	D2	D5	O	S	T	X	[Kg]
P001	650	60	50	335	370	410	25	22	880	16	31
P011	700	70	60	375	410	450	30	22	955	20	36
P021	750	90	70	415	460	500	35	22	1035	24	58
P031	800	110	90	465	510	560	35	26	1125	20	70
P041	900	150	120	485	560	620	40	33	1270	20	117
P051	1000	160	130	535	590	650	40	33	1390	24	147
P061	1200	180	150	615	690	760	50	39	1655	24	183
P071	1500	230	200	695	770	840	60	39	2020	24	315
P081	1600	230	200	755	840	920	70	45	2160	24	360

Tightening torques

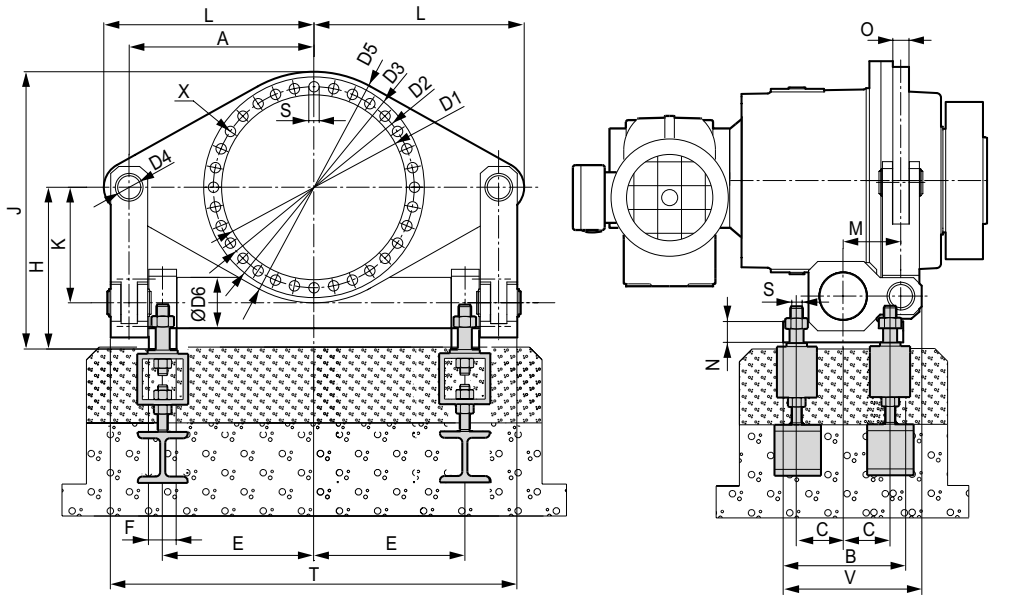
- **Only use class 8.8 screws in accordance with the table below.**
- **Tighten the screws with the specified tightening torque.**

Gear unit type	Screws DIN	Thread	Number	Strength classes	Tightening torque [Nm] ± 20 %
P001	912/931	M20	20	8.8	310
P011	912/931	M20	20	8.8	310
P021	912/931	M20	24	8.8	310
P031	912/931	M24	20	8.8	540
P041	912/931	M30	20	8.8	1100
P051	912/931	M30	24	8.8	1100
P061	912/931	M36	24	8.8	1830
P071	912/931	M36	24	8.8	1830
P081	912/931	M42	24	8.8	3200

Double-sided torque arms

Do not place torque arms under strain during installation.

The reaction torque from the gear unit output torque is absorbed via the lever arms A. The resulting reactive force is absorbed in the foundation. No reaction forces act on the gear unit and machine bearings. The torque arm must be screwed onto a structure or foundation provided by the customer using the foot screws.



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Dimensions

Gear unit type	Dimensions in [mm]											
	A	B	C	D1	D2	D3	D4	D5	D6	E	F	H
P061	500	500	190	610	690	770	90	810	200	370	110	640
P071	600	500	190	690	770	850	90	890	200	470	110	640
P081	700	520	200	750	840	930	100	970	220	555	120	710

Gear unit type	Dimensions in [mm]									Number	Weight
	J	K	L	M	N	O	S	T	V	X	[Kg]
P061	1045	460	595	240	70	60	39	1140	560	24	780
P071	1085	460	695	240	70	60	39	1340	560	24	895
P081	1195	520	810	260	80	70	45	1560	600	24	1292

Tightening torques

- **Only use class 8.8 screws in accordance with the table below.**
- **Tighten the screws with the specified tightening torque.**

Gear unit type	DIN screws	Thread	Number	Strength class	Tightening torque [Nm] ± 20 %
P061	912/931	M36	8	8.8	1830
P071	912/931	M36	8	8.8	1800
P081	912/931	M42	8	8.8	3200

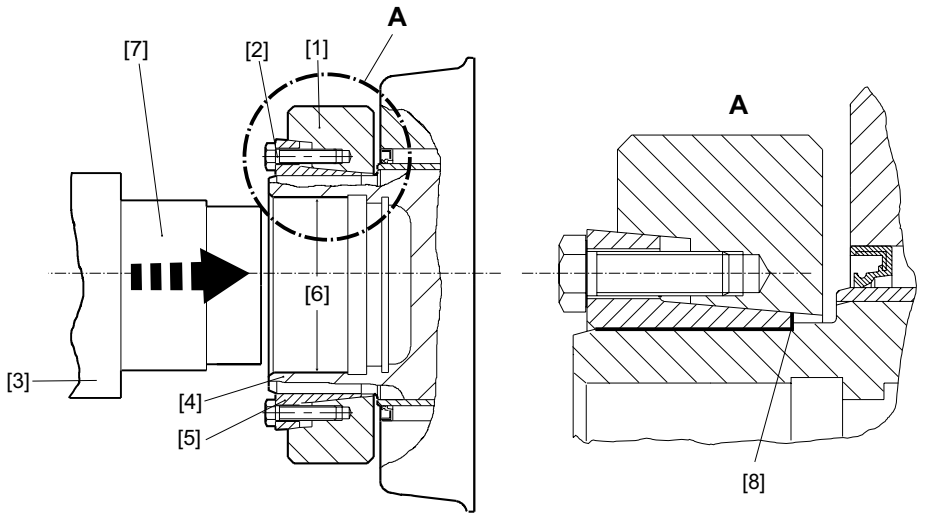
4.8 Assembly / disassembly of hollow shaft gear units and shrink discs

Assembly instructions

- **Do not disassemble the shrink disc before the first installation.**
- **Never tighten the locking screws until the machine shaft has been installed.**
- **Do not tighten the locking screws in diametrically opposite sequence.**
- **On the outside surface of the shrink disc, the bore of the hollow shaft and the machine shaft must be absolutely free from any grease. This is a very important factor for the reliability of torque transmission. Contaminated solvents and cleaning rags are not suitable for degreasing.**

The shrink discs are delivered preassembled and ready for installation.

Installation



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[1] Outer ring	[5] Inner ring
[2] Locking screw	[6] Free of grease
[3] Machine shaft	[7] Free of grease
[4] Hub	[8] Correct position of the shrink disc

1. Before installing the shrink disc, clean and degrease the hub [4] and the machine shaft [3]. This is a very important factor for the reliability of torque transmission.
2. Ensure that the dimensions of the machine shafts correspond to SEW specifications.

3. Slide the loose shrink disc onto the hub [4].
4. Check the correct position of the shrink disc [8]. The shrink disc is positioned correctly when it is in contact with the shaft shoulder.
   – Never tighten the locking screws [2] until the machine shaft [3] has been installed.
5. Install the machine shaft [3] or slide the hub [4] to a stop on the machine shaft [3]. Perform the mounting sequence slowly to allow the compressed air to escape around the outside of the shaft.
6. Tighten the locking screws [2] manually first. Tighten all locking screws by working round equally (not in diametrically opposite sequence) in 1/4 turn increments.
7. **Observe the tightening torque** → see the table below. Tighten the locking screws [2] by continuing to work round in 1/4 turns until you reach the tightening torque. Additionally, you can visually check to see that the front lateral surfaces are aligned to the outer [1] and inner rings [5].

Verify the type details on your shrink disc and choose the tightening torque.

Shrink disc type	Gear unit type	Screws	Rated torque [Nm]	Tightening torque [Nm] ± 20 %
3191	**P001**	M16	41000	250
3181	**P011**	M16	75500	290
	P021	M16	95500	290
	P031	M20	134000	570
	P041	M20	194000	570
	P051	M20	255000	570
	P061	M24	405000	980
	P071	M24	525000	980
	P081	M24	720000	980
3171	**P011**	M16	61400	250
	P021	M16	77500	250
	P031	M20	109000	490
	P041	M20	159000	490
	P051	M20	207000	490
	P061	M24	331000	840
	P071	M24	427000	840
	P081	M24	584000	840

Disassembly

Danger of injury if disassembly is not performed correctly.

1. Loosen the locking screws [2], working around in 1/4 turns for each screws.

   If the rings [1] [5] do not loosen from each other, unscrew as many screws as there are forcing threads and screw these equally into the forcing threads until the tapered bushing is pushed out of the tapered ring.

   Under no circumstances should more locking screws be unscrewed than there are forcing threads present, else there is a potential risk of injury.
2. Remove the machine shaft [3] or pull the hub [4] off the customer shaft (first, remove any corrosion, which may have formed between the hub and the shaft end).
3. Remove the shrink disc from the hub [4].

Cleaning and lubrication

Do not disassemble and regrease the removed shrink disc before installing it again. Only clean the shrink disc if it is contaminated.

Next, regrease only the inner sliding surfaces of the shrink disc.

Use a solid lubricant with a friction factor of μ = 0.04.

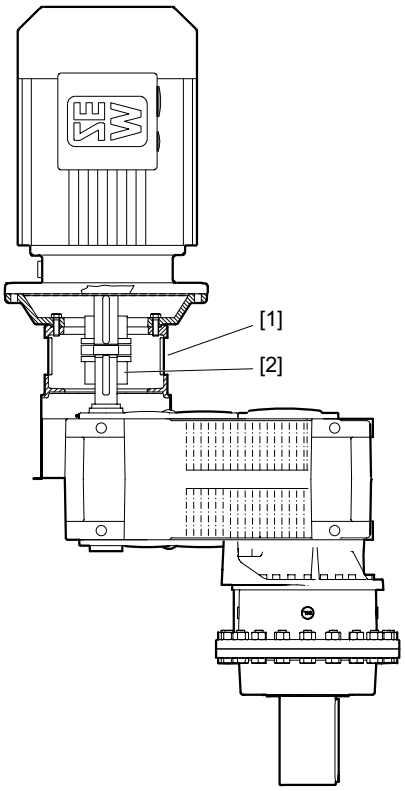
Lubricant	Sold as
Molykote 321 R (lube coat)	Spray
Molykote spray (powder spray)	Spray
Molykote G Rapid	Spray or paste
Aemasol MO 19R	Spray or paste
Molykombin UMFT 1	Spray
Unimoly P5	Powder

4.9 Mounting a motor with motor adapter

Motor adapters [1] are available for mounting IEC / NEMA motors to P.MC series industrial gear units.

For mounting the coupling [2], refer to the notes in Sec. "Mounting couplings".

The figures below show the basic structure of the motor adapter.



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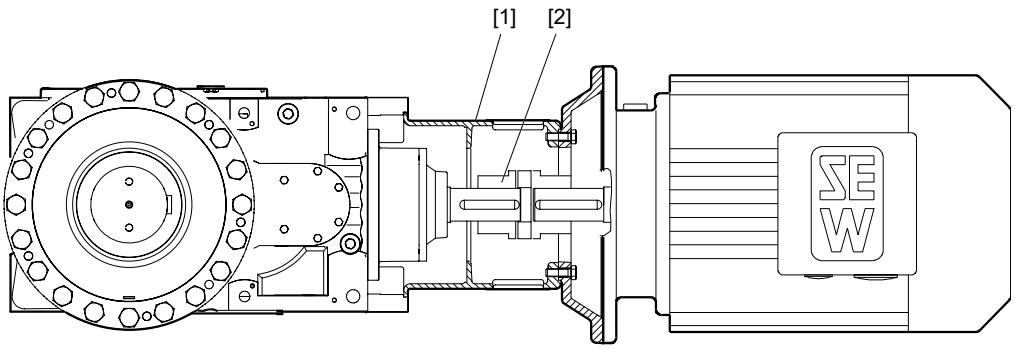
[1] Motor adapter

[2] Coupling



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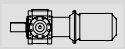
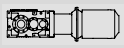
[1] Motor adapter

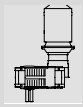
[2] Coupling

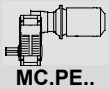
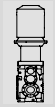
When selecting a motor, **take into account the** permitted **motor weight**, the **gear unit mounting position** and the **type of gear unit mounting** according to the following tables.

The following applies to all tables:

G_M = Motor weight G_G = Gear unit weight

Type of Mounting	Industrial Gear Unit Series	
	 MC.PL..	 MC.RL..
Foot mounting	$G_M \leq G_G$	$G_M \leq G_G$
Shaft mounted design	$G_M \leq 0.5G_G$	$G_M \leq G_G$
Flange mounting	$G_M \leq 0.5G_G$	$G_M \leq G_G$

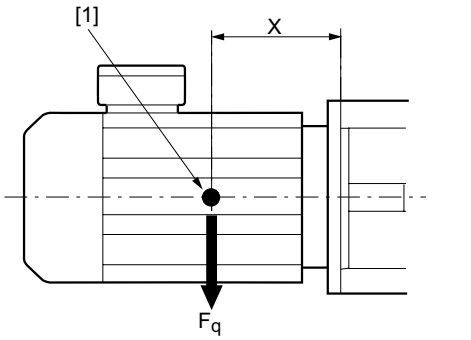
Type of Mounting	Industrial Gear Unit Series	
	 MC.PV..	MC.RV..
Foot mounting	$G_M \leq 1.5G_G$	$G_M \leq G_G$
Shaft mounted design	$G_M \leq G_G$	$G_M \leq G_G$
Flange mounting	$G_M \leq G_G$	$G_M \leq 0.75G_G$

Type of Mounting	Industrial Gear Unit Series	
	 MC.PE..	 MC.RE..
Foot mounting	$G_M \leq G_G$	$G_M \leq 1.5G_G$
Shaft mounted design	$G_M \leq G_G$	$G_M \leq G_G$
Flange mounting	$G_M \leq G_G$	$G_M \leq G_G$

These tables are for stationary operation only. Contact SEW-EURODRIVE if the gear unit moves while in operation (e.g. travel drive).

Permitted motors that can be mounted

When mounting motors, observe the center of gravity of the motor and the weight of the motor.



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[1] Center of gravity of the motor

These tables only apply to the following correlation of motor size / weight Fq and dimension "x".

IEC motor size	NEMA motor size	$F_{q\ max}$ [N]	X [mm]
132S	**213/215**	579	189
132M	**213/215**	677	208
160M	**254/286**	1059	235
160L	**254/286**	1275	281
180M	**254/286**	1619	305
180L	**254/286**	1766	305
200L	**324**	2354	333
225S	**365**	2943	348
225M	**365**	3237	348
250M	**405**	4267	395
280S	**444**	5984	433
280M	**445**	6475	433
315S	**505**	8142	485
315M	**505**	8927	485
315L		11772	555

The maximum approved weight of the attached motor F_q has to be reduced in a linear manner if the center of gravity distance x is increased. $F_{q\ max}$ cannot be increased if the center of gravity distance is reduced.

Please contact SEW-EURODRIVE in the following cases:

- If a motor adapter is removed, re-alignment is necessary.
- When retrofitting motor adapters with a cooling air fan (not for motors of sizes 132S and 132M).

5 Mechanical Installation Options

5.1 Important installation instructions

- **Strictly observe the safety notes in the individual sections.**
- **Disconnect the motor from the power supply before starting work on couplings and secure it against unintentional restart.**
- **Work on the gear unit only when the machine is not in use.**
- **Never drive couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **In the case of belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.**
- **Input and output elements such as couplings must be equipped with a touch guard!**
- **Power transmission elements should be balanced after installation and must not give rise to excessive radial or axial forces.**
- **Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.**

Assembly is easier if you first apply lubricant to the output element or heat it up briefly (to 80 ... -100 °C).

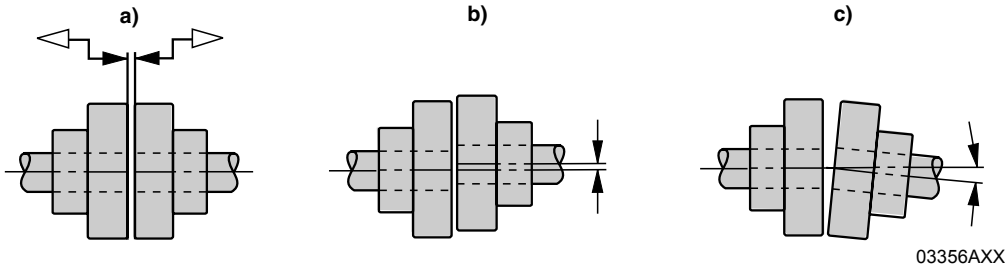
Installation note for couplings

Adjust the following misalignments when mounting couplings:

a) Axial misalignment (maximum and minimum clearance)

b) Axle misalignment (concentric running fault)

c) Angular misalignment

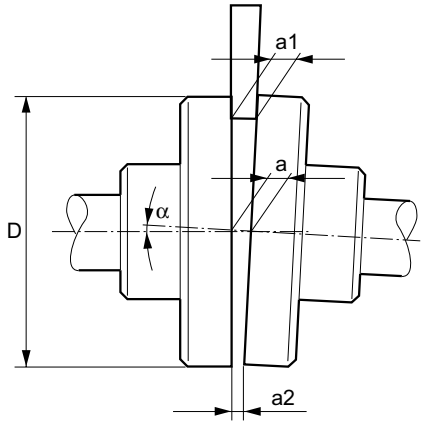


Note:

The following methods for measuring angular and axial misalignment are important for complying with the mounting tolerances specified in Sec. "Mounting of couplings"!

Measuring angular misalignment with a feeler gauge

The following figure shows the measurement for angular misalignment (α) using a feeler gauge. When using this method, an accurate result is only achieved when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and the average value is then calculated from the difference ($a_1 - a_2$).



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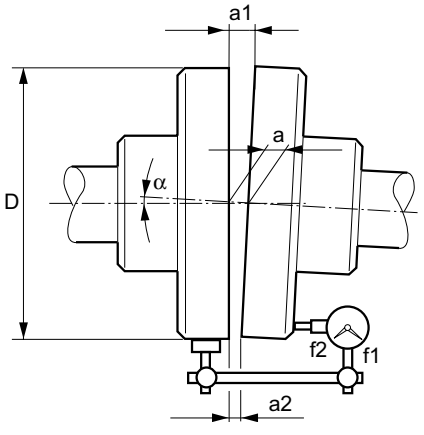
Measuring angular misalignment using a micrometer dial

The following figure shows the measurement for angular misalignment using a micrometer dial. This measuring method provides the same result as described under "Measuring angular offset with a feeler gauge" if the **coupling halves are rotated together**, for instance with one coupling pin, so that the needle of the micrometer dial does not move noticeably on the measuring surface.



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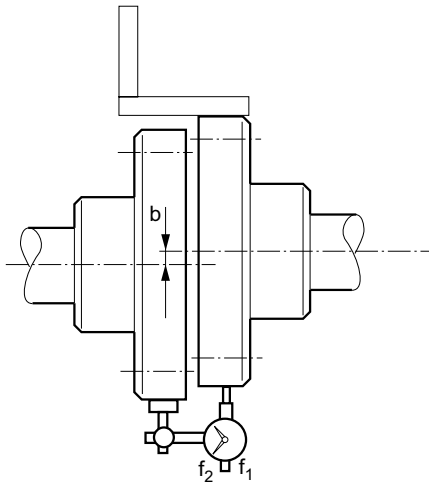
A prerequisite for this measuring method is that there is no axial clearance in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).

Measuring offset misalignment using straight-edge and micrometer dial

The following figure shows the measurement for offset misalignment using a straight-edge. Permissible values for eccentricity are usually so small that the best measurement results can be achieved with a micrometer dial. If you **rotate one coupling half** together with the micrometer dial and divide the deviation by two, the micrometer dial will indicate the deviation and as a result the misalignment (dimension "b"), which includes the offset misalignment of the other coupling half.



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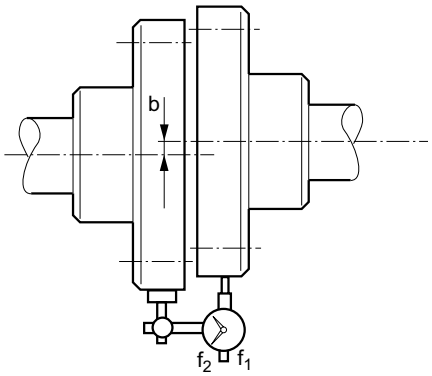
Measuring offset misalignment using a micro-meter dial

The following figure shows the measurement for offset misalignment using a **more accurate measuring method**. The **coupling halves** are **rotated together** without the tip of the micrometer dial moving on the measuring surface. The offset misalignment is obtained by dividing the deviation indicated on the micrometer dial (dimension "b").



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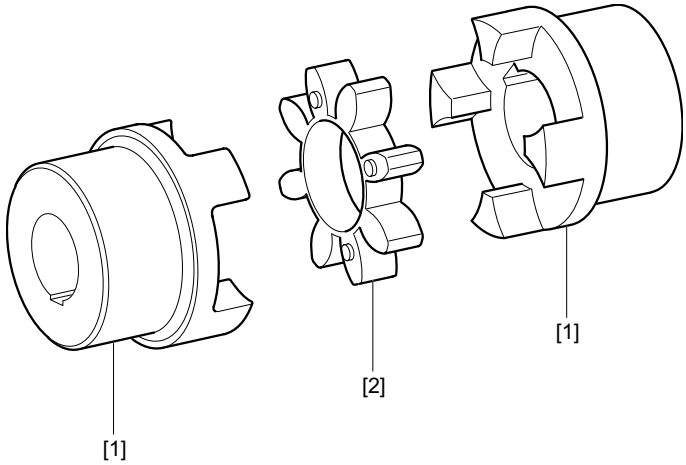
5.2 Installing couplings

ROTEX coupling

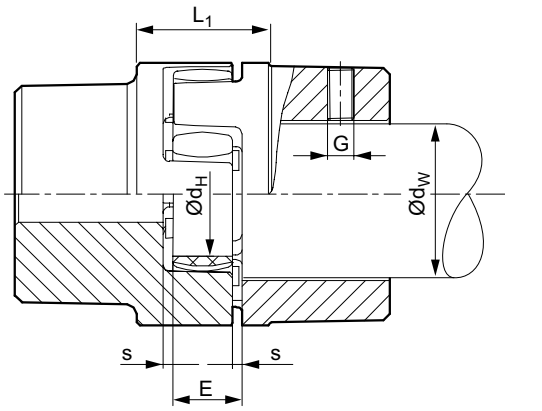


[1] Coupling hub

[2] Ring gear

The low-maintenance, elastic ROTEX coupling is capable of compensating radial and angular misalignment. Careful and exact alignment of the shaft ensures long service life of the coupling.

Mounting the coupling halves onto the shaft



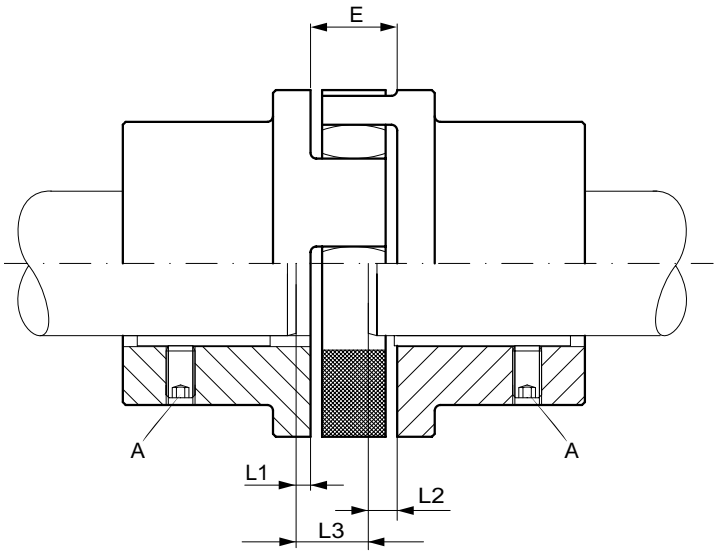
STOP

The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.

Coupling size	Mounting dimensions						Locking screw	
	E [mm]	s [mm]	d_H [mm]	d_W [mm]	L_1 (aluminum / cast iron / ductile iron) [mm]	L_1 (steel) [mm]	G	Tightening torque [Nm]
14	13	1.5	10	7	-	-	M4	2.4
19	16	2	18	12	26	-	M5	4.8
24	18	2	27	20	30	-	M5	4.8
28	20	2.5	30	22	34	-	M6	8.3
38	24	3	38	28	40	60	M8	20
42	26	3	46	36	46	70	M8	20
48	28	3.5	51	40	50	76	M8	20
55	30	4	60	48	56	86	M10	40
65	35	4.5	68	55	63	91	M10	40
75	40	5	80	65	72	104	M10	40
90	45	5.5	100	80	83	121	M12	69
100	50	6	113	95	92	-	M12	69
110	55	6.5	127	100	103	-	M16	195
125	60	7	147	120	116	-	M16	195
140	65	7.5	165	135	127	-	M20	201
160	75	9	190	160	145	-	M20	201
180	85	10.5	220	185	163	-	M20	201

Mounting dimensions of ROTEX coupling in motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.



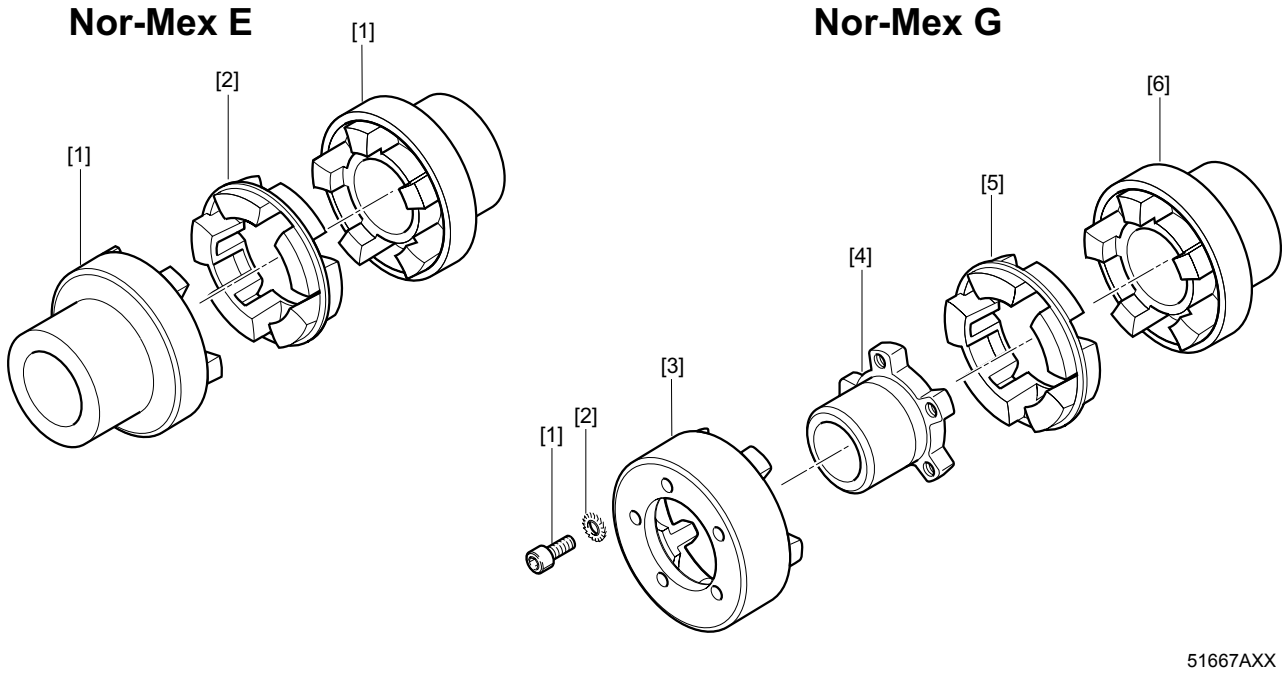
The mounting dimensions specified in the following table only apply to mounting a ROTEX coupling in a motor adapter. They apply to all gear unit versions and gear ratios.

The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.

ROTEX coupling size	IEC motor size	Mounting dimensions			
		E [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]
R28/38	**132**	20	0	–17	3
R38/45	**160**	24	1	0	25
R42/55	**180/200**	26	–1	0	25
R48/60	**225**	28	0	–3	25
R55/70	**225**	30	0	–5	25
R65/75	**250/280**	35	0	–10	25
R75/90	**315**	40	0	–15	25
R90/100	**315**	45	–20	0	25

Nor-Mex coupling, types G and E

The low-maintenance Nor-Mex couplings types G and E are torsionally flexible couplings capable of compensating axial, angular, and radial misalignments. Torque is transmitted via an elastic element with high damping properties, which is also oil and heat resistant. The couplings can be used for either direction of rotation and can be mounted in any position. The design of the Nor-Mex coupling type G allows to replace the elastic element [5] without misalignment of the shafts.

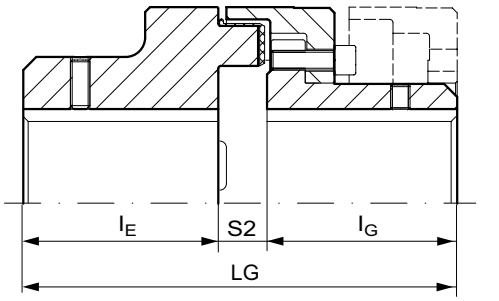


[1] Coupling hub
[2] Elastic element

[1] Socket head screw
[2] Tooth lock washer
[3] Claw ring
[4] Flange hub
[5] Elastic element
[6] Coupling hub

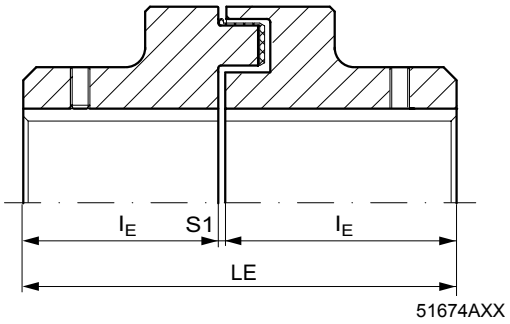
Mounting instructions, mounting dimensions for Nor-Mex G coupling

After having mounted the coupling halves, ensure that the recommended play (dimension S_2 for type G, dimension S_1 for type E) and the overall length (dimension L_G for type G and dimension L_E for type E) corresponds with the dimensions given in the following tables. Accurate alignment of the coupling (→ Sec. 'Mounting tolerances') ensures long service life.



Nor-Mex G Coupling size	Mounting dimensions				Weight [kg]
	l_E [mm]	l_G [mm]	L_G [mm]	Permitted deviation S_2 [mm]	
82	40	40	92	12±1	1.85
97	50	49	113	14±1	3.8
112	60	58	133	15±1	5
128	70	68	154	16±1	7.9
148	80	78	176	18±1	12.3
168	90	87	198	21±1.5	18.3
194	100	97	221	24±1.5	26.7
214	110	107	243	26±2	35.5
240	120	117	267	30±2	45.6
265	140	137	310	33±2.5	65.7
295	150	147	334	37±2.5	83.9
330	160	156	356	40±2.5	125.5
370	180	176	399	43±2.5	177.2
415	200	196	441	45±2.5	249.2
480	220	220	485	45±2.5	352.9
575	240	240	525	45±2.5	517.2

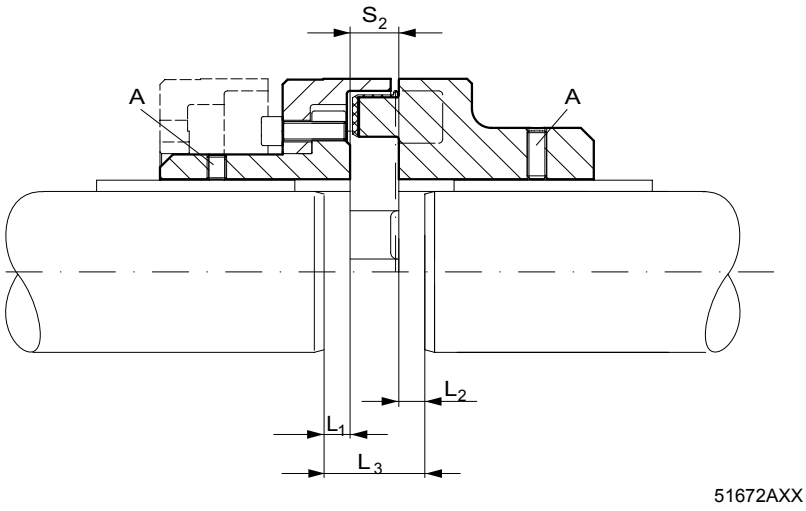
Mounting dimensions of the Nor-Mex E coupling



Nor-Mex E Coupling size	Mounting dimensions			
	l_E [mm]	LE [mm]	Permitted deviation S_1 [mm]	Weight [kg]
67	30	62.5	2.5± 0.5	0.93
82	40	83	3± 1	1.76
97	50	103	3± 1	3.46
112	60	123.5	3.5± 1	5
128	70	143.5	3.5± 1	7.9
148	80	163.5	3.5± 1.5	12.3
168	90	183.5	3.5± 1.5	18.4
194	100	203.5	3.5± 1.5	26.3
214	110	224	4± 2	35.7
240	120	244	4± 2	46.7
265	140	285.5	5.5± 2.5	66.3
295	150	308	8± 2.5	84.8
330	160	328	8± 2.5	121.3
370	180	368	8± 2.5	169.5
415	200	408	8± 2.5	237
480	220	448	8± 2.5	320
575	240	488	8± 2.5	457

Mounting dimensions of the Nor-Mex G coupling in the motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.



The mounting dimensions specified in the following table only apply to mounting a Nor-Mex coupling in a motor adapter.

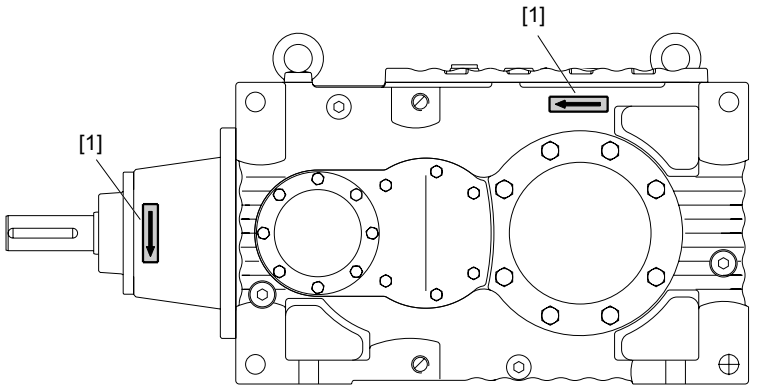
NOR-MEX G.. Coupling size		97	97	112	128	148	168	194	214
	IEC motor size	132	160	160/180	200	225	250/280	280/315	315
Gear unit size Gear ratio i	Mounting dimensions	[mm]							
All All	S_2	14	14	15	16	18	21	24	26
	L_3	3	25	25	25	25	25	25	25
MC3R02 i = 14 ... 63	L_2	-	5	5	5	10	2	1	0
	L_1	-	6	5	4	–3	2	0	–1
MC3R05 i = 14 ... 63	L_2	-	5	5	5	4	2	5	0
	L_1	-	6	5	4	3	2	–4	–1
MC3R08 i = 14 ... 63	L_2	-	5	5	5	4	2	1	5
	L_1	-	6	5	4	3	2	1	–6
Other P.MC.. i = 7.1 ... 112	L_2	–5	5	5	5	4	2	1	0
	L_1	–6	6	5	4	3	2	0	–1

5.3 FXM backstop

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in one specified direction of rotation only.

- **Do not start up the motor in the blocking direction. Be sure that the motor power supply is correctly attached so that the motor rotates in the required direction. Operating the motor in the direction that is blocked could destroy the backstop.**
- **Consult SEW-EURODRIVE if you want to change the blocking direction.**

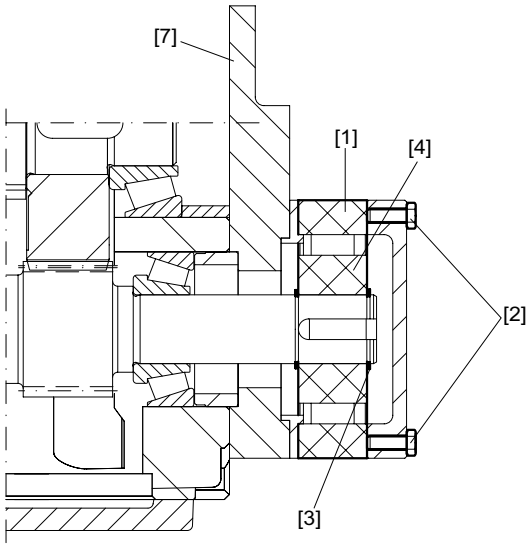
The maintenance-free FXM type backstop is a centrifugally operated backstop with sprags that lift off. Once the lift-off speed is reached, the sprags completely lift off from the contact surface of the outer ring. The backstop is lubricated with gear oil. An arrow on the gearcase indicates the permitted direction of rotation [1] (→ following figure).



Changing the direction of rotation

To change the direction of rotation, turn the inner ring with the sprags by 180°. Pull out the inner ring with the sprags using a pulling-off device (not included in the scope of delivery) and replace turned by 180° (see next page).

... with backstop mounted outside the gear unit



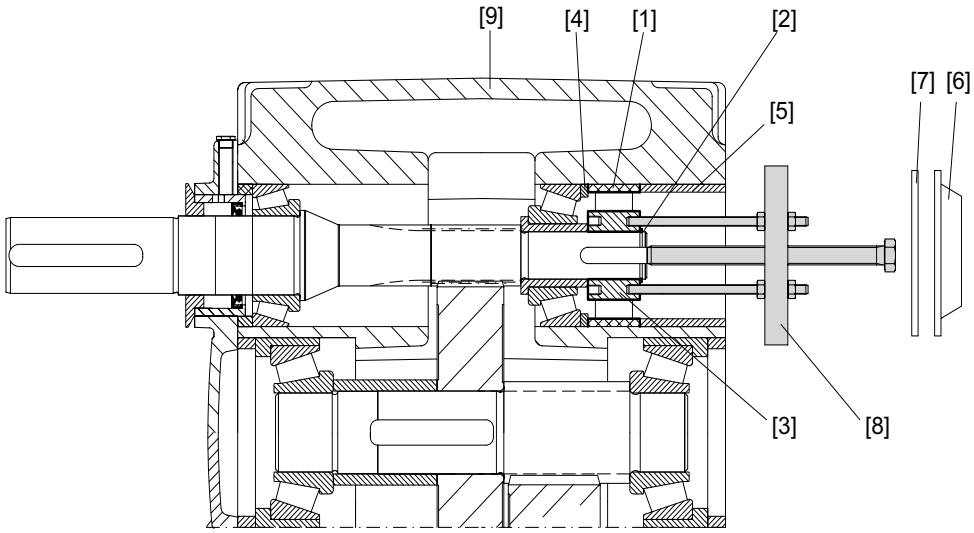
[1] Outer ring
[2] Retaining screws
[3] Circlip
[4] Inner ring with cage and sprags

1. Drain the gear oil (→ Sec."Inspection and Maintenance").
2. Loosen the retaining screws [2] of the backstop.
3. Remove the outer ring [1]. To facilitate dismounting, slightly turn the outer ring [1] in freewheeling direction.
4. Remove circlip [3], and inner ring with cage and sprags [4].
5. Turn the inner ring [4] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [4] only. Use the threaded holes on the inner ring [4] for mounting.
6. Fix the inner ring [4] with the circlip [3] in axial direction. Mount the outer ring [1] using the retaining screws [2]. Observe the tightening torques specified in the following table:

Screw size	Tightening torque [Nm]
M5	6
M6	10
M8	25
M10	48
M12	84
M16	206
M20	402
M24	696
M30	1420

7. Alter the direction arrow on the gearcase.
8. Refill the gear oil (→ Sec. 9). Check the oil level.
9. After mounting, check that the backstop runs smoothly.

... with backstop mounted inside the gear unit



[1] Outer ring
[2] Circlip
[3] Inner ring with cage and sprags
[4] Supporting ring
[5] Sleeve
[6] Bearing cover
[7] Shims
[8] Pulling device

1. Drain the gear oil (→ Sec."Inspection and Maintenance").
2. Remove bearing cover [6], shims [7] and sleeve [5]. It is important that shims [7] and sleeve [5] between bearing cover [6] and outer ring [1] are not mixed up because they must be assembled in the correct order.
3. Remove the circlip [2] from the input shaft.
4. Remove the inner ring with the cage and wedge elements [3] using a suitable pulling device [8]. Use the threaded holes on the inner ring [3] for mounting.
5. Turn the inner ring [3] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [3] only.
6. When mounting the backstop, turn it in freewheeling direction so that the sprags move into the outer ring.
7. Fix the inner ring [3] with the circlip [2] in axial direction.
8. Mount the sleeve [5], shims [7] and bearing cover [6] in reverse order.
9. Alter the direction arrow on the gearcase.
10. Refill the gear oil (→ Sec. 9). Check the oil level.
11. After mounting, check that the backstop runs smoothly.

5.4 SHP shaft end pump

Usage

The maintenance-free shaft end pump SHP.. can be used to lubricate gear unit parts of gear unit sizes MC04 to MC09 that are not submerged in the oil bath. The shaft end pump can be operated in both directions of rotation.

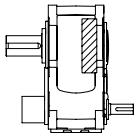
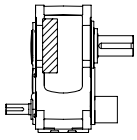
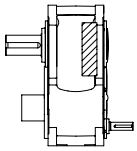
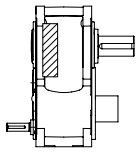
A minimum input speed is necessary for correct working of the shaft end pump. Therefore, always consult SEW-EURODRIVE in the event of variable input speeds (e.g. with inverter controlled drives) or when changing the input speed range of an already delivered gear unit with shaft end pump.

Pump position

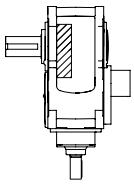
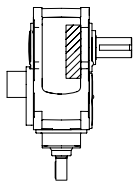
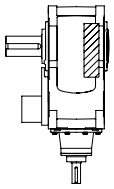
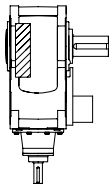
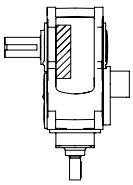
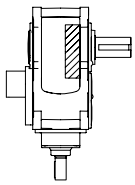
The pump is mounted externally to the gear unit and is directly driven by the input shaft or intermediate shaft of the gear unit. A high reliability of the pump function is ensured in this way. The pump position depends on the following factors:

- Number of gear unit stages
- Gear unit type (helical or bevel-helical)
- Shaft position of the gear unit
- Output shaft type

Check for interference of the shaft end pump with other surrounding structures.

	Shaft positions			
	23	13[1)]	24[1)]	14
MC2PS • Solid shaft				
MC3PS • Solid shaft				

1) The maximum permitted external loads on the output shaft are lower.

	Shaft positions			
	03	04	03[1)]	04[1)]
MC2R • Solid shaft				
MC3RS • Solid shaft				

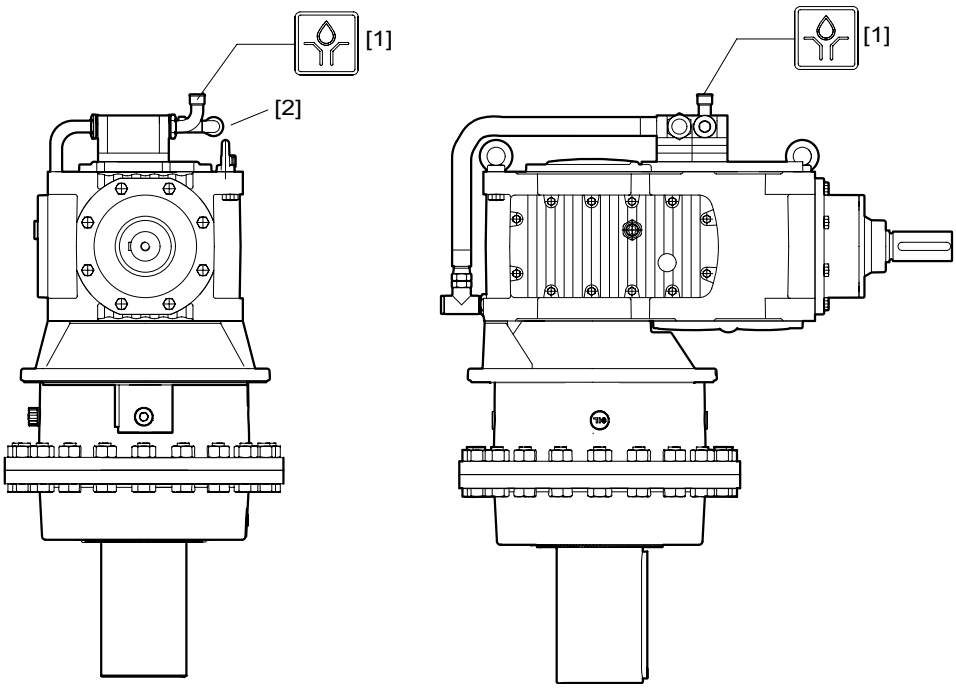
1) The maximum permitted external loads on the output shaft are lower.

Pump suction

- **It is essential that the gear unit is sufficiently lubricated from the very beginning!**
- **Do not change the diameter of the tube / pipe connection!**
- **Do not open the pressure line [PRE]!**
- **If the shaft end pump does not build up pressure within 10 seconds after the gear unit has been started, please contact SEW-EURODRIVE.**

Shaft end pump mounted on top of the P.MC.V.. gear unit

Danger of dry-start with shaft end pump mounted on top of gear unit.



58058AXX

[1[Separate oil filling plug on the intake pipe

[2] Oil flow monitor or optical oil flow indicator (not visible in the figure)

It is essential that the oil pump begins to pump oil as soon as the main motor begins to rotate. If the pump does not begin to pump oil immediately, open the separate oil filling plug [1] and pour in oil (1-4 liters). Once the oil begins to circulate (check with flow switch or visual flow indicator [2]), close the separate oil filling plug.

This procedure is particularly important if the gear unit has been standing for a long period of time and there is air in the suction pipe and oil pump.

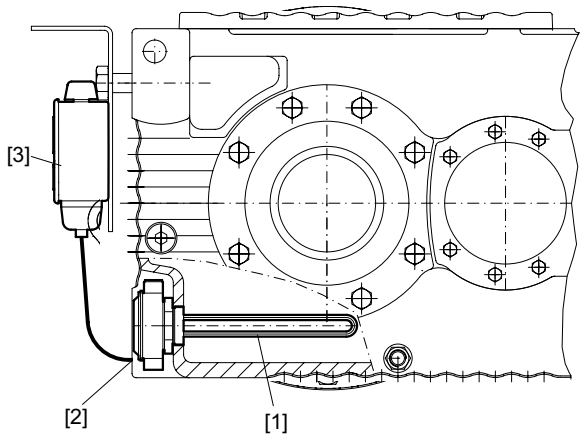
5.5 Oil heater

Oil heating is required to ensure lubrication at startup when the ambient temperature is low (e.g. cold start of the gear unit).

Purpose and basic design

The oil heater consists of three basic parts:

1. Resistor element in the oil bath ("Oil heater") with terminal box
2. Temperature sensor
3. Thermostat

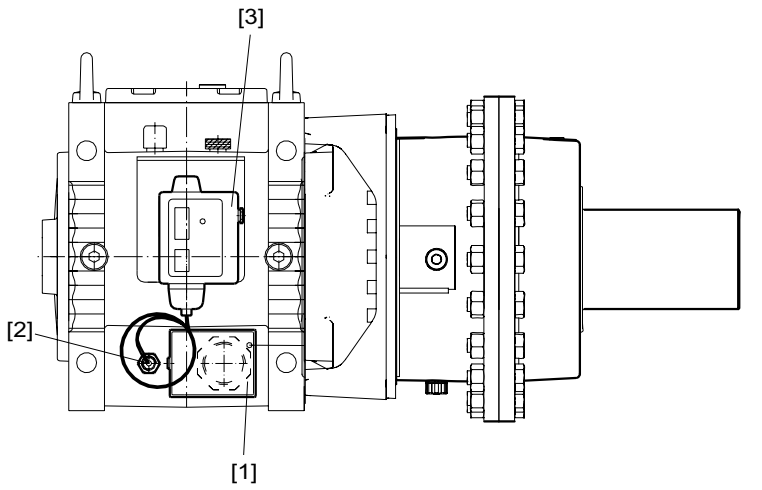


58062AXX

[1] Oil heater

[2] Temperature sensor

[3] Thermostat

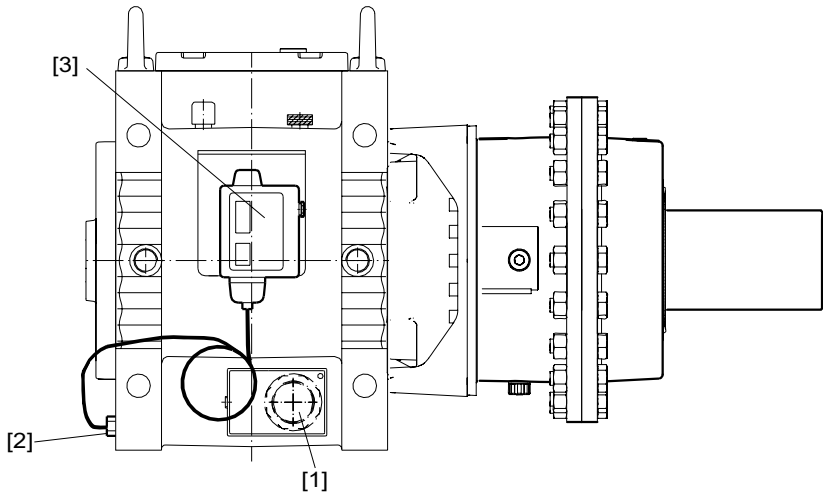


58059AXX

[1] Oil heater

[2] Temperature sensor

[3] Thermostat



[1] Oil heater [2] Temperature sensor [3] Thermostat

Activation / deactivation behavior

- The oil heater is activated when the factory set temperature is reached. This temperature setpoint depends on the following factors:
  - Forth splash / bath lubrication: on the pourpoint of the used oil
  - For pressure lubricated units: on the temperature at which the oil viscosity reaches a maximum of 2000 cSt

	Switching point for splash / bath lubrication [°C]					
ISO VG	**680**	**460**	**320**	**220**	**150**	**100**
Mineral oil	–7	–10	–15	–20	–25	–28
Synthetic oil		–30	–35	–40	–40	–45

	Switching point for pressure lubrication [°C]					
ISO VG	**680**	**460**	**320**	**220**	**150**	**100**
Mineral oil	+25	+20	+15	+10	+5	
Synthetic oil		+15	+10	+5	0	–5

- The oil heater is deactivated when the set temperature is exceeded by 8 to 10°C.

Thermostat and oil heater are usually installed on the gear unit and are ready for operation but without electrical connections. Therefore, do the following before startup:

1. Connect the resistor element ("Oil heater") to the power supply
2. Connect the thermostat to the power supply

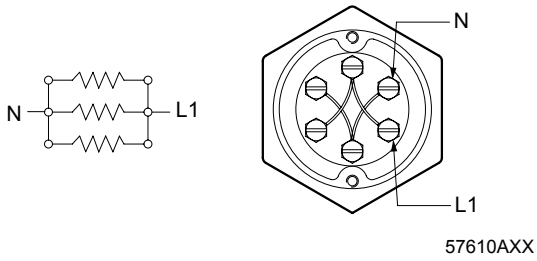
Technical data

Gear unit size	Current consumption oil heater [W]	Voltage supply [V_{AC}]
04 - 06	600	See separate data sheet[1)]
07 - 09	1200	

1) Only use voltage specified in separate data sheet.

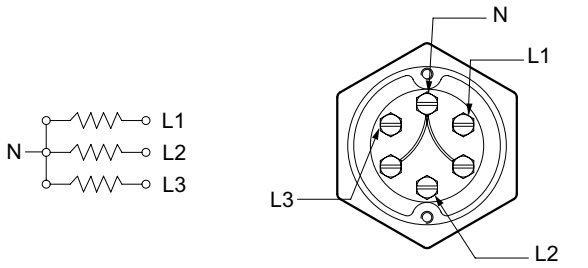
Electrical connection resistor element

Wiring examples with 230 / 400 V supply voltage



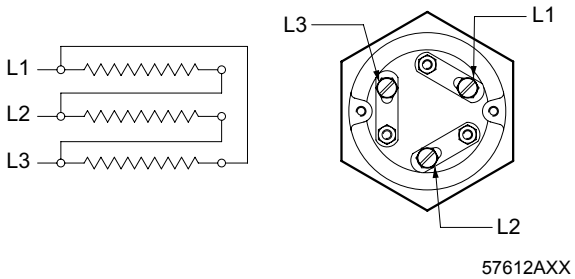
57610AXX

1-phase	
Voltage	230 V
Phase voltage	230 V
Mains voltage	400 V
Resistor element voltage	230 V



57611AXX

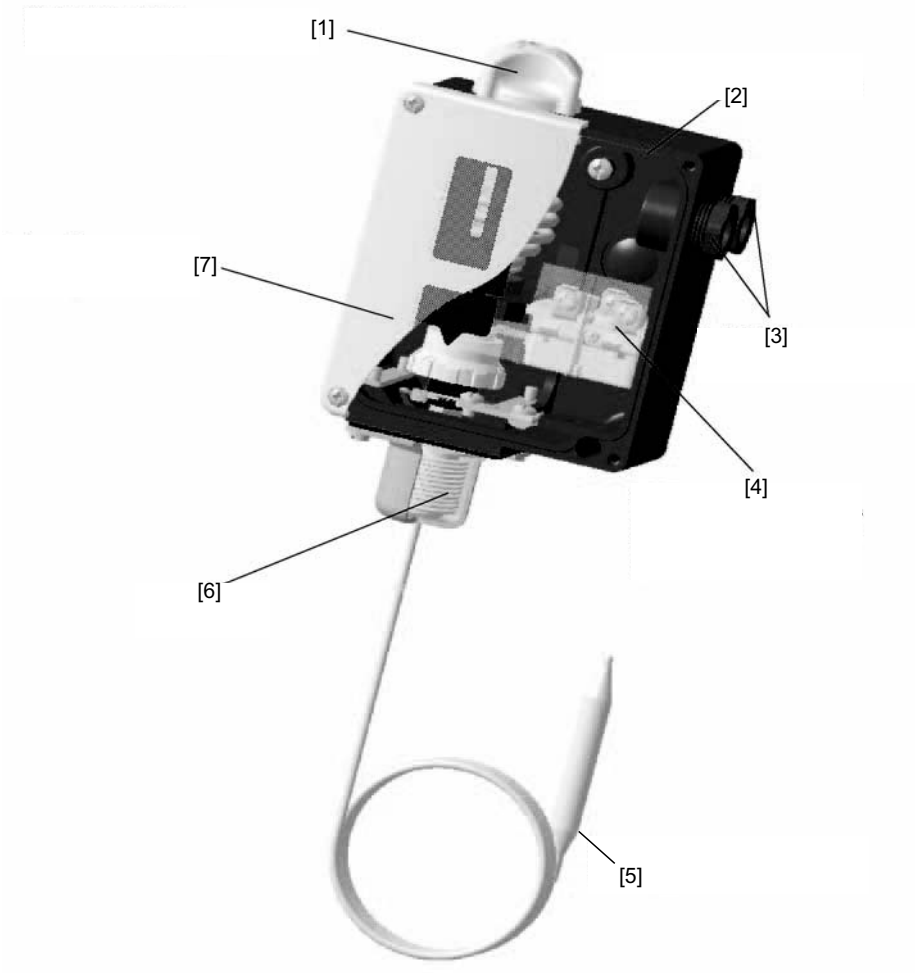
3-phase / star connection	
Voltage	230/400 V
Phase voltage	230 V
Mains voltage	400 V
Resistor element voltage	230 V



57612AXX

3-phase / delta connection	
Voltage	400 V
Mains voltage	400 V
Resistor element voltage	400 V

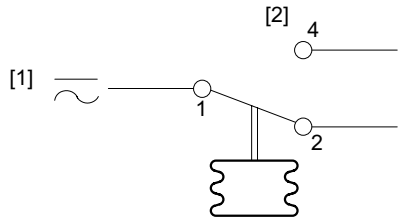
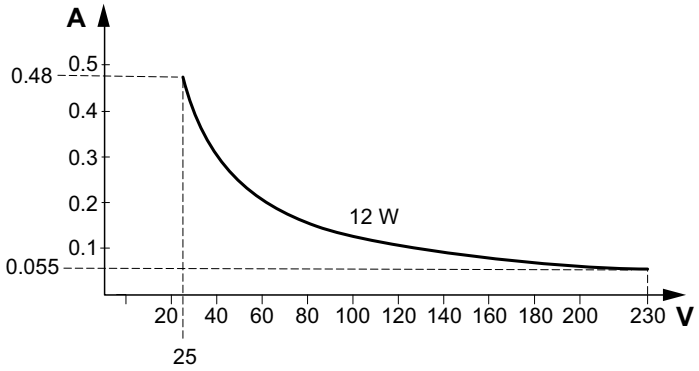
Basic structure of thermostat



53993AXX

[1] Setting knob
[2] Degree of protection IP66 (IP54 in units with external reset)
[3] 2 x PG 13.5 for cable diameter 6 mm → 14 mm
[4] SPDT contact system, exchangeable
[5] Capillary tube length up to 10 m
[6] Stainless steel corrugated tube
[7] Polyamide housing

Basic structure of thermostat

	Thermostat RT
Ambient temperature	– 50 °C to +70°C
Connection diagram	 [1] Cable [2] SPDT
Connection data **Contact material:** **AgCdO**	**Alternating current:** AC-1: 10 A, 400 V AC-3: 4 A, 400 V AC-15: 3 A, 400 V **Direct current:** DC-13: 12 W, 230 V 
Cable entry	2 PG 13.5 for cable diameter of 6 -14 mm
Degree of protection	IP66 acc. to IEC 529 and EN 60529, IP54 for units with external reset. The thermostat housing is made of bakelite according to DIN 53470, the cover is made of polyamid.

A contactor must be used in the following cases:

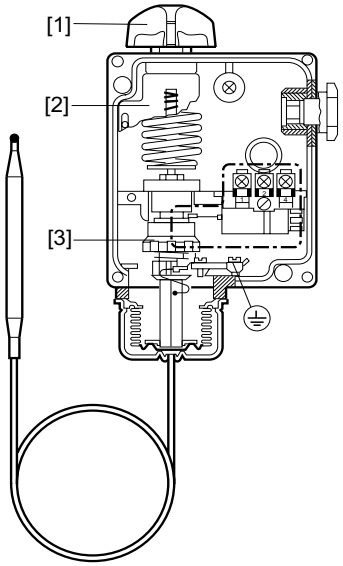
- 3-phase voltage supply
- 2 heating rods
- Current ratings exceed nominal values of thermostat

Adjusting the setpoint

The setpoint is usually set at the factory. Proceed as follows for adjustment:

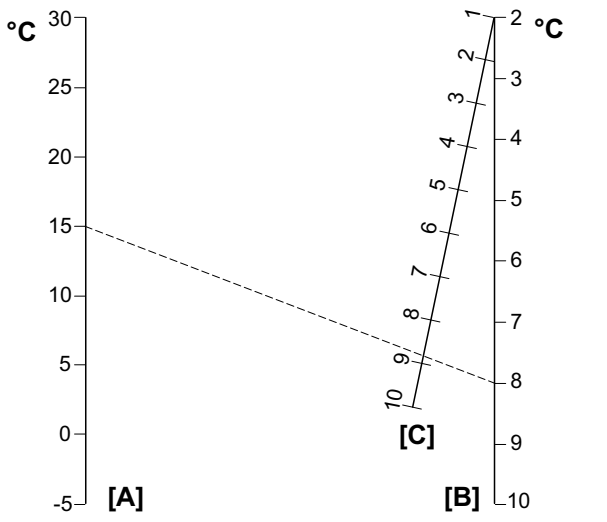
The range is set by using the setting knob [1] while at the same time reading the main scale [2]. Use a tool if the thermostat is equipped with a cap. The differential is set using the differential disc [3].

The size of the differential obtained for the relevant thermostat can be established by comparing the set main scale value and the scale value on the differential disc with the help of a nomogram.



53994AXX

[1] Setting knob
[2] Main scale
[3] Differential setting disc



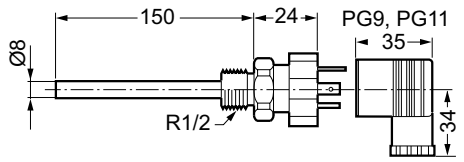
53992AXX

[A] Setting range
[B] Obtained differential
[C] Differential setting

5.6 PT100 temperature sensor

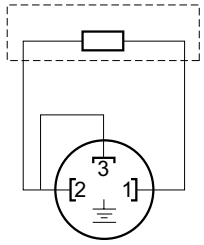
The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

Dimensions



50533AXX

Electrical connection



50534AXX

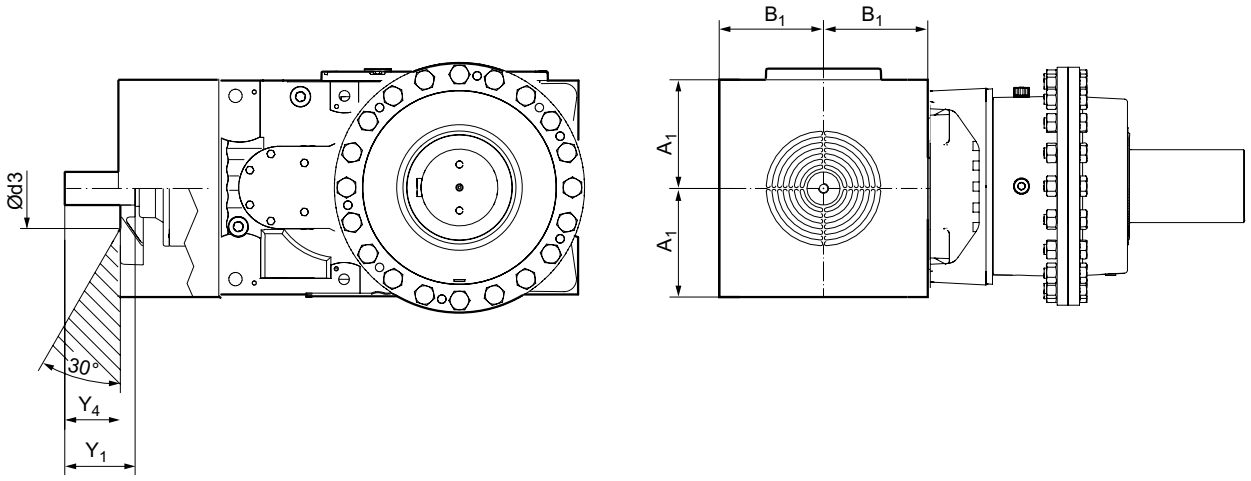
Technical data

- Sensor tolerance $\pm(0.3 + 0.005 \times t)$, (corresponds to DIN IEC 751 class B), t = oil temperature
- Plug connector DIN 43650 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection = 25 Nm

5.7 Fan

Make sure air intake vents are not blocked or covered!

A fan can be mounted if the projected thermal power of the gear unit is exceeded. A fan can be retrofitted if the ambient conditions change after having installed the gear unit. The direction of rotation of the gear unit does not influence the operation of the fan.



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Gear unit type	A_1	B_1	Y_4	Y_1	Air intake	
	[mm]				∅ d_3 [mm]	Angle
PMC3RL..02	158	160	70	100	109	30°
PMC3RL..03	178	165	82	112	131	
PMC3RL..04	198	185	90	120	131	
PMC3RL..05	213	195	95	125	156	
PMC3RL..06	232	220	100	130	156	
PMC3RL..07	262	230	105	135	156	
PMC3RL..08	297	255	105	135	198	
PMC3RL..09	332	265	110	140	226	

5.8 Flow switch

Usage

The flow switch is an electrical switch used for controlling the correct functioning of a pressure lubrication system (→ shaft end pump; → motor pump) by checking the oil flow.

In deliveries since March 1, 2005, the flow switch is a standard feature for all gear units supplied with

- Motor pump
- A shaft end pump with an oil flow rate of 8.5 l/min or higher.

Shaft end pumps with a flow rate below 8.5 l/min are equipped only with a visual flow indicator (→ Visual flow indicator) as standard (as of 2006).

If the flow rate exceeds 8.5 l/min, the gear unit is delivered with a visual flow indicator and flow switch (as of 2006).

Selection

SEW-EURODRIVE selects the flow switch. As standard, a flow switch of the type DW-R-20 is used. All the following technical data refer to this type.

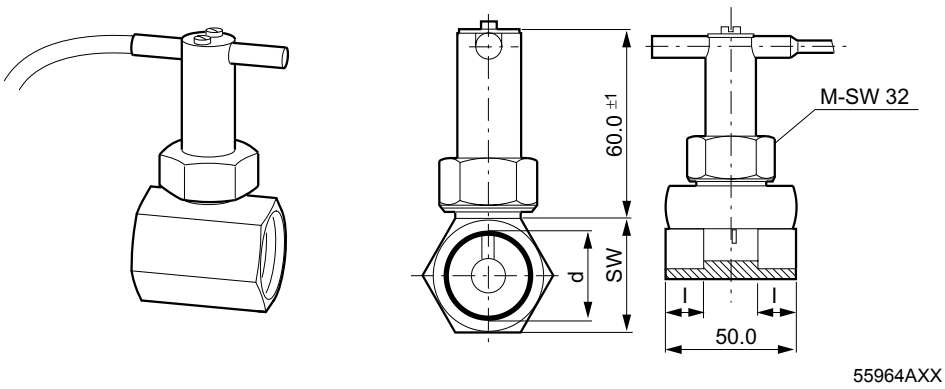
Function

The oil flow pushes against a circular plate attached to a pendulum. The pendulum, which is regulated by a spring, moves on its pivot. A magnet attached to the end of the pendulum operates a movable reed contact. The switch unit itself is separated from the oil.

The flow switch has two switching points:

1. Switching point HIGH (lower limit of flow rate) → contact closed - ON
2. Switching point LOW (upper limit of flow rate) → contact closed - OFF

Dimensions



	d (inner thread)	NW (rated width)	I	SW	Z	Z	L	H	Z
			[mm]						
Material				A+B+C	A+B	C	D	D	D
Dimension	R ¾ "	20	11	30	50	50	19	109	66

Material abbreviations:

A = Brass

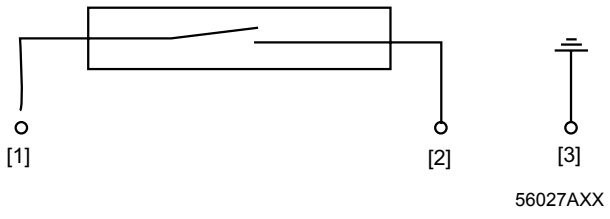
B = Nickel-plated brass

C = Stainless steel

D = Stainless steel / PVC

For determining the exact position of the flow switch, refer to the order-specific dimension drawing.

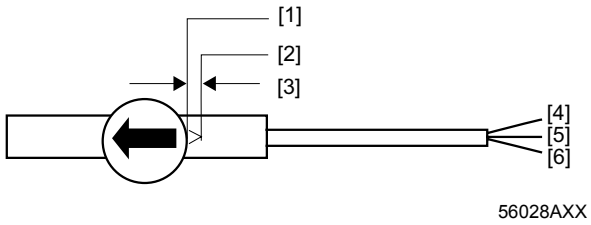
Electrical connection



[1] Brown

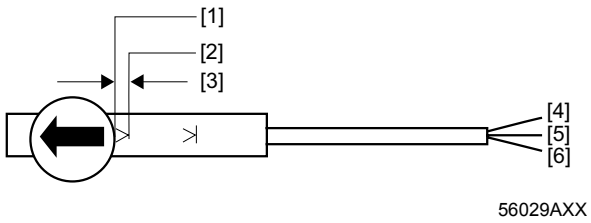
[2] Blue

[3] Yellow / green



56028AXX

[1] Switching point HIGH
[2] Switching point LOW
[3] Setting range
[4] Blue
[5] Brown
[6] Yellow / green



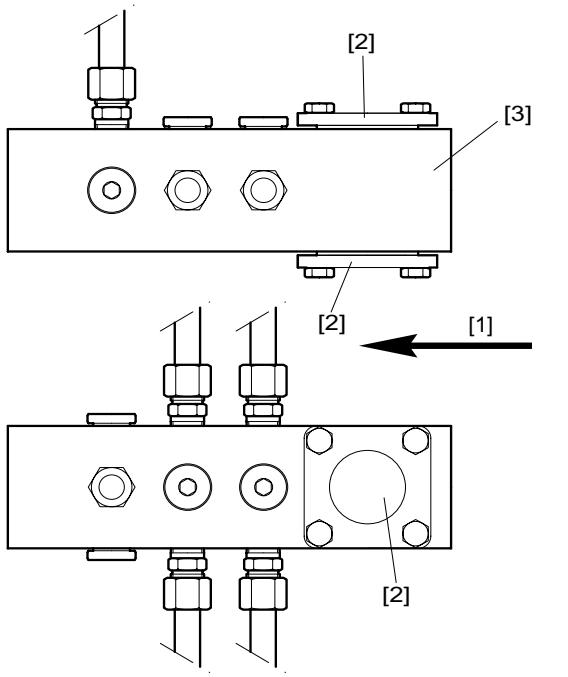
56029AXX

[1] Switching point HIGH
[2] Switching point LOW
[3] Setting range
[4] Blue
[5] Brown
[6] Yellow / green

Connection data:	230 V; 1,5 A; 80 W, 90 $V_{A\ max}$
Degree of protection:	IP 65
Maximum temperature of medium:	110 ° C
Maximum ambient temperature:	70 ° C
Maximum working pressure:	25 bar
Length of connecting cable:	1.5 m
Switch:	Switch can be used as normally closed or normally open contact; SPDT switch available on request
Switch hysteresis:	ca. 5 %

Type	Switching point range ON	Switching point range OFF	Maximum flow rate
	[l/min]		
DW-R-20	8.5 - 12.0	6.6 - 11.0	80

5.9 Visual flow indicator



[1] Oil flow direction

[2] Glass

[3] Oil distributor block

Usage

The visual flow indicator is a simple method of checking the functioning of a pressure lubrication system by visually checking the oil flow. The visual flow indicator is a standard feature in all gear units with oil pump (as of 2006).

Gear units with oil pump and a flow rate above 8.5 l/min are equipped with an electrical flow switch and visual flow indicator (as of 2006).

Function

The oil flow can be seen behind the glass [2]. If no oil flows and / or if there are air bubbles in the oil, check the function of the pump and suction pipes with connections.

It is easier to see the oil flow when the glasses [2] are clean and bright light is used on the other side of the oil distribution block.

5.10 Oil expansion tank and oil riser pipe

An oil expansion tank or an oil riser pipe may be necessary for vertical output shaft positions. Please refer to the order documents for information.

5.11 Connecting the oil / water cooling system

Follow the instructions in the separate manufacturer's documentation when connecting the oil / water cooling system.

5.12 Connecting the oil / air cooling system

Follow the instructions in the separate manufacturer's documentation when connecting the oil / air cooling system.

5.13 Connecting the motor pump

Follow the instructions in the separate manufacturer's documentation when connecting the motor pump.

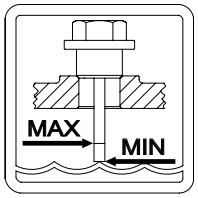
6 Startup

6.1 Gear unit startup

- **It is essential to adhere to the safety notes in Sec. "Safety Notes."**
- **It is essential that there is no open fire or risk of sparks when working on the gear unit.**
- **Take preventive measures to protect people from the solvent vapors generated by the vapor phase inhibitor!**
- **Before startup, check that the oil level is correct. For lubricant fill quantities, refer to Sec. "Lubricants."**
- **For gear units with long-term protection: Replace the screw plug on the location indicated by the breather plug (Position → Sec. "Mounting Positions").**
- **Check the surface temperature before you perform maintenance on the gear unit or refill the gear unit oil. Risk of burns (hot oil in the gear unit).**

Before startup

- **Remove dust and dirt from the gear unit surface.**
- **For gear units with long-term protection:** Remove the gear unit from the sea-worthy protection box.
- Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.
- Before filling the gear unit with the correct oil grade and volume, drain the remaining amount of protection oil. To do so, unscrew the oil drain plug and drain the remaining protection oil. Thread the oil drain plug back in place.



- Remove the oil filling plug (Position → Sec. "Mounting Positions"). Use a funnel to fill the oil (filter mesh max. 25 µm). Fill the gear unit with the correct oil grade and volume (→ Sec. "Nameplate"). The oil volume specified on the nameplate of the gear unit is an approximate value. **The mark on the dipstick is the decisive indicator of the correct oil level.** Check for correct oil level (= below the "max" mark on the dipstick) using the oil dipstick. After having filled the oil, replace the oil filling plug.
- For industrial gear units with steel oil expansion tanks (→ section 6.3 'Startup of MC industrial gear units with steel oil expansion tanks')

- **For gear units with oil sight glass (sec. 7.3): Control whether the oil level is correct with a visual inspection (= oil can be seen through oil sight glass).**
- Ensure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If the gear unit has a motor pump, check for proper functioning of the pressure lubricating system. Make sure that monitoring devices are connected properly.
- After an extended period of storage (max. two years), have the gear unit operate without load with the correct oil fill (→ Sec. "Nameplate"). This way, the correct functioning of the lubricating system and particularly the oil pump is ensured.
- If the gear unit is equipped with a fan on the input shaft, check for free air intake within the specified angle (→ Sec. "Fan").

Running-in period

SEW-EURODRIVE recommends running-in the gear unit as the first phase of startup. Increase the load and speed of revolutions in two to three steps up to maximum level. The running-in phase takes approx. 10 hours.

Check the following points during the run-in phase:

- Verify the power values specified on the nameplate because their frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noises?
- Are there signs of leakage (lubricants) on the gear unit?

For further information and troubleshooting, refer to the "Malfunctions" section.

6.2 Startup of gear units with long-term protection

Adhere to the following points for gear units with long-term protection:

Anti-corrosion agent:

Ensure sufficient ventilation when using solvents. There is a risk of explosion. No open flames.

Risk of material damage.

Do not let the solvent come into contact with the sealing lips of the oil seals.

Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.

Oil level

Since the gear units under "long-term protection" are delivered complete with oil, the correct oil volume and oil level should be checked before startup.

→ Correct the oil level to the appropriate fill level.

Breather plug:

Replace the corresponding screw plug by the enclosed breather plug.

6.3 Startup of gear units with backstop

Ensure that the direction of rotation of the motor is correct for gear units with backstop.

6.4 Shutting down the gear unit

Turn off the drive unit. Prevent the drive unit from unintentionally starting up.

Put an information sign near the ON switch.

If the gear unit will not be operated for an extended period of time, you must activate it regularly at intervals of approx. 2-3 weeks.

If the gear unit will not be operated for a period **longer than nine months**, additional corrosion protection is required:

- **Corrosion protection for the interior of gear units with splash or oil bath lubrication:**
  - Fill the gear unit up to the breather plug with the oil grade specified on the name-plate.
  - Set the planetary gear unit in no-load running operation for a short period of time.

- **Exterior corrosion protection:**
  - Clean the surfaces.
  - Grease the shaft around the sealing lip to separate the sealing lip of the oil seal and the corrosion protection.
  - Apply a wax-based protective coating to shaft ends and unpainted surfaces as corrosion protection.

Refer to the "Startup" section before restarting the gear unit.

7 Inspection and Maintenance

- **Strictly observe the safety notes in the individual sections.**
- **All maintenance work must be carried out carefully by qualified personnel.**
- **All maintenance work on the gear unit and additional equipment must only be carried out when the machine is not in use. Prevent the drive unit from starting up unintentionally (for example, by locking the keyswitch or removing the fuses from the power supply). Attach an information sign near the ON switch to warn that the gear unit is being worked on.**
- **Use only OEM spare parts according to the delivered spare parts lists.**
- **If you remove the gearcase cover, you must apply new sealing compound to the sealing surface. Else the sealing properties of the gear unit might be impaired. It is essential to contact SEW-EURODRIVE in this case.**
- **Prevent foreign objects from entering into the gear unit during the following work.**

Danger of burns

Touching the gear unit when it has not been cooled will result in burns.

Never touch the gear unit during operation or in the cool down phase once the unit has been switched off.

7.1 Inspection and maintenance intervals

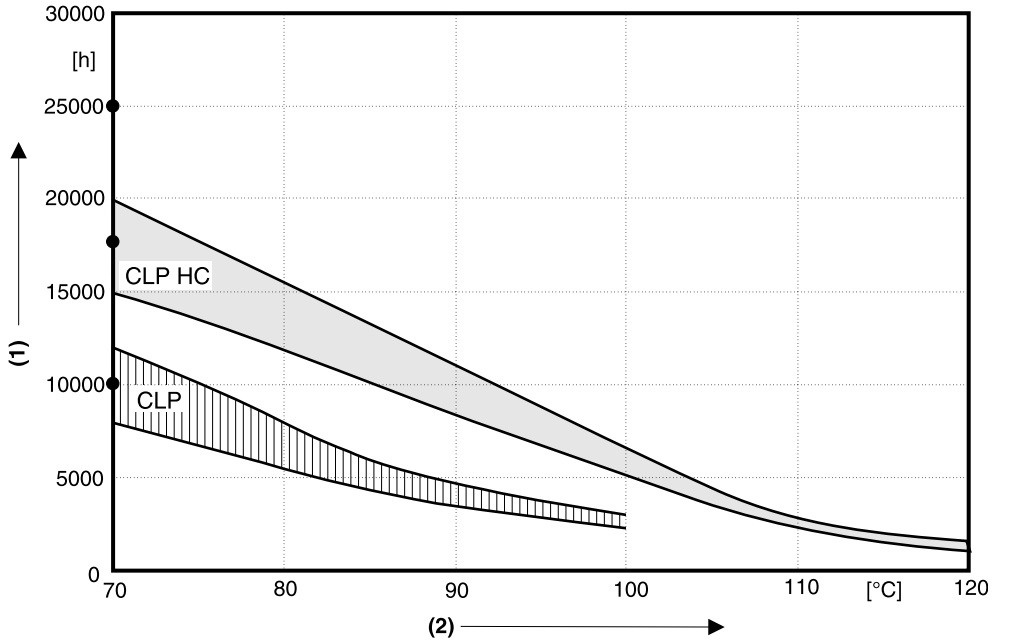
Maintenance interval	What to do?
• **Daily**	• Check the housing temperature: – with mineral oil: max 90 °C – with synthetic oil: max. 110 °C • Check gear unit noise • Check gear unit for signs of leakage
• **Every 3000 hours of operation, at least every 6 months:**	• Checking the oil level • Check the oil: If the gear unit is operated outdoors or in humid conditions, check the water content of the oil. The water content must not exceed 0.05 % (500 ppm). • Fill labyrinth seals with grease. Use about 30 g grease per grease nipple. • Clean breather plug
• **Depending on the operating conditions, at the latest every 12 months**	• Change the mineral oil (→ Sec. "Inspection and Maintenance") • Check whether retaining screws are tightly secured • Check contamination and condition of the oil / air cooling system • Check the condition of the oil / water cooling system • Clean oil filter, replace filter element if necessary
• **Depending on the operating conditions, at the latest every 3 years**	• Change the synthetic oil (see Sec. "Inspection and Maintenance")

• **Varying (depending on external factors)**	• Touch up or renew the surface / anticorrosion coating
	• Clean the gearcase surface and fan
	• Check the oil heater:
	  • Are all connection cables and terminals tightened securely and free from corrosion?
	  • Clean incrusted elements (e.g. heating element) and replace, if required (→ Sec. "Inspection and Maintenance").

7.2 Lubricant change intervals

Change the oil more frequently when using special versions subject to more severe / aggressive environmental conditions!

Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.



(1) Operating hours
(2) Sustained oil bath temperature
• Average value per oil type at 70 °C

7.3 Checking the oil level

- **Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.**
- **The positions of the oil level plug, drain plug, and breather valve depends on the mounting position. Refer to the diagrams of the mounting positions**.
- **Mineral oil is used as standard lubricant.**

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.

Wait until the gear unit has cooled off - Danger of burns!

3. For gear units with oil dipstick:
   - Unscrew the oil dipstick and remove it.
   - Clean the oil dipstick and re-insert it into the gear unit (do **not** screw in tightly).
   - Remove dipstick again and check oil level. Correct, if necessary. The oil level is correct when it is between the oil level mark (= maximum oil level) and the end of the dipstick (= minimum oil level).
4. For gear units with oil sight glass (option):
   - Visually check for correct oil level (= middle of oil sight glass).

7.4 Checking the oil consistency

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.

Wait until the gear unit has cooled off - Danger of burns!

3. Remove a little oil from the oil drain plug.
4. Check the oil consistency:
   - For more detailed information on checking the oil for water content and viscosity, contact your lubricant manufacturer.
   - Contact SEW-EURODRIVE if the oil is heavily contaminated.

7.5 Changing the oil

- **When changing the oil, always refill the gear unit with the grade of oil that was used before. Mixing oil of different grade is not permitted. Especially synthetic oils may not be mixed with mineral oils or other synthetic oils. If you switch from mineral oil to synthetic oil, or from synthetic oil on a certain basis to synthetic oil with a different basis, you will have to flush the gear unit thoroughly with the new oil.**
- **Refer to the lubrication table in section 9 to determine which oils from the various lubricant manufacturers can be used.**
- **Information such as the oil grade, oil viscosity and required oil quantity is listed on the nameplate of the gear unit.**
- **The oil volume specified on the nameplate is an approximate quantity. The markings on the oil sight glass or dipstick are the decisive indicators for the quantity of oil used to fill the unit.**
- **Only change the oil when the gear unit is at operating temperature.**
- **When changing the oil, flush the housing thoroughly with oil to remove oil sludge, oil residue, and abrasion. Use the same grade of oil that is used to operate the gear unit. Viscous oil must first be heated up. Fill with fresh oil only after all residues have been removed.**
- **The position of the oil level plug, oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.**

Procedure

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.

Wait until the gear unit has cooled off - Danger of burns!

The gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it more difficult to drain the oil correctly.

When changing the oil, clean the gearcase thoroughly to remove oil residues and abrasion. Use the same oil grade as for the operation of the gear unit.

If your gear unit is equipped with an oil expansion tank, let the gear unit cool off until it reaches ambient temperature. The reason is that there might still be oil in the oil expansion tank which might leak through the oil filling hole!

Any dripping oil must be removed immediately with an oil binding agent.

3. Place a container underneath the oil drain plug.

4. Remove the oil filling plug, breather plug and oil drain plugs. When using a steel oil expansion tank, also remove the air outlet screw on the air expansion tank. To drain all the oil, blow air through the breather into the oil expansion tank. As a result, the rubber membrane lowers and forces the remaining oil out. The lowering membrane compensates the pressure, which facilitates filling the new oil.
5. Drain all the oil.
6. Screw in the oil drain plug.
7. Use a funnel to fill the oil (filter mesh max. 25 mm). Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
   - Fill the oil according to the volume specified on the nameplate (→ Sec. "Nameplate"). The oil volume specified on the nameplate is an approximate value. **The marks on the oil dipstick indicate the correct oil level.**
   - Check whether the oil level is correct using the oil dipstick.
8. Screw the oil level plug back in If your gear unit is equipped with a steel oil expansion tank, also screw in the air outlet screw.
9. Screw in the breather plug.
10. Clean the oil filter, replace the filter element if necessary (when using an external oil / air or oil / water cooling system).

7.6 Checking and cleaning the breather plug

The breather plug must be cleaned if there is a layer of dust and also before the expiration of a minimum period of three months.

To do so, remove the breather plug, clean it with benzine or a similar cleaning agent, and dry or blow the breather plug with compressed air. Prevent foreign objects from entering into the gear unit.

8 Malfunctions

- **Strictly observe the safety notes in the individual sections.**
- **For eliminating malfunctions, the gear unit and additional equipment must be deactivated. Prevent the drive unit from starting up unintentionally (for example, by locking the keyswitch or removing the fuses from the power supply). Attach an information sign near the ON switch to warn that the gear unit is being worked on.**

Danger of burns

Touching the gear unit when it has not been cooled will result in burns.

Never touch the gear unit during operation or in the cool down phase once the unit has been switched off.

Malfunctions that occur during the warranty period that require repair to the gear unit may only be resolved by SEW-EURODRIVE.

After the warranty period has elapsed, we recommend that our customers contact our customer service when malfunctions occur and the cause is not clear.

8.1 Customer service

Please have the following information to hand if you require the assistance of our customer service:

- Complete nameplate data
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause

8.2 Gear unit malfunctions

Malfunction	Possible cause	Remedy
Unusual, regular running noise	A Meshing/grinding noise: Bearing damage B Knocking noise: Irregularity in the gearing	A Check the oil (→ Sec. "Inspection and Maintenance), replace bearings B Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	• Check the oil (→ Sec. "Inspection and Maintenance") • Stop the drive, contact customer service
Unusual noise in the area of the gear unit mounting	Gear unit mounting has loosened	• Tighten retaining screws and nuts to the specified torque • Replace the damaged / defective retaining screws or nuts
Operating temperature too high	A Too much oil B Oil too old C The oil is heavily contaminated D Gear units with fan: air intake opening / gearcase contaminated E Shaft end pump defective F Malfunctions of oil / air or oil / water cooling system	A Check the oil level, correct if necessary (→ Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (→ Sec. "Inspection and Maintenance") C Change the oil (→ Sec. "Inspection and Maintenance") D Check the air intake opening and clean if necessary, clean gearcase E Check shaft end pump; replace if necessary F Observe the separate operating instructions for the oil / water and oil / air cooling system.
Bearing point temperatures too high	A Oil not enough B Oil too old C Shaft end pump defective D Bearing damaged	A Check the oil level, correct if necessary (→ Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (→ Sec. "Inspection and Maintenance") C Check shaft end pump; replace if necessary D Check bearing and replace if necessary, contact customer service
Oil leaking[1)] • **from cover plate** • **from the gear cover plate** • **from bearing cover** • **from mounting flange** • **from output / input end oil seal**	A Gasket on cover plate / gear unit cover / bearing cover / mounting flange leaks B Sealing lip of the oil seal turned up C Oil seal damaged / worn	A Tighten the bolts on the respective cover plate and observe the gear unit. If oil still leaks: Contact customer service B Vent the gear unit (→ Sec. "Mounting Positions") Observe the gear unit. If oil still leaks: Contact customer service C Contact customer service
Oil leaking • **oil drain plug** • **breather plug**	A Too much oil B Drive operated in incorrect mounting position C Frequent cold starts (oil foams) and / or high oil level	A Correct the oil volume (→ Sec. "Inspection and Maintenance) B Mount the breather plug correctly (→ order documents) and correct the oil level (→ nameplate)
Malfunctions of oil / air or oil / water cooling system		Observe the separate operating instructions for the oil / water and oil / air cooling system.
Operating temperature at backstop too high	Damaged / defective backstop	• Check backstop; replace if necessary • Contact customer service

1) During the run-in phase (24-hour run time), it is normal for small amounts of oil / grease to leak from the oil seal (see also DIN 3761).

9 Lubricants

9.1 Guidelines for lubricant selection

General information

Unless a special arrangement is made, SEW-EURODRIVE delivers the P.MC.. gear units without an oil fill.

- **Before startup, ensure that the gear unit is filled with the correct oil grade and volume. You find the corresponding information on the gear unit nameplate and the lubricant table in the following section.**
- **The most important factors for selecting the lubricant are the oil grade and viscosity specified on the nameplate. The specified viscosity / oil grade are chosen for the operating conditions agreed upon in the contract. Any deviation from these conditions requires consultation with SEW-EURODRIVE.**
- **This lubricant recommendation in no way represents a guarantee as to the quality of the lubricant delivered by each respective supplier. The lubricant manufacturers are responsible for the quality of their products.**
- **Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.**

If you have selected synthetic oil because of the operating temperature or oil change intervals, SEW-EURODRIVE recommends polyalphaolefin-based oil (PAO).

9.2 Lubricant table

General information The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Please refer to the following legend for the lubricant table.

Legend to the lubricant table

Abbreviations used, meaning of shading, and notes:

CLP	= Mineral oil
CLP PAO	= Synthetic polyalphaolefin
	= Synthetic lubricant (= synthetic-based anti-friction bearing grease)
	= Mineral lubricant (= mineral-based anti-friction bearing grease)
	= Contact SEW-EURODRIVE
	Ambient temperature

Notes on the lubricant table

- **The temperature ranges should be considered as guide values. The decisive factor is the viscosity information on the nameplate.**
- **Contact SEW-EURODRIVE if you operate the unit under extreme conditions, such as cold, heat, or there have been changes to the operating conditions since project planning.**

Lubricant table

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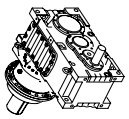
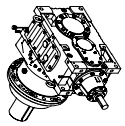
°C	DIN (ISO)	ISO VG class	Mobil®	Shell	KLÜBER LUBRICATION	ARAL	bp	TEXACO	FUCHS	Q8	Castrol	TOTAL
-10 +25	CLP	VG 150			KLÜBER GEM 1-150N	Degol BG Plus 150	BP Energol GX-XF 150		Renolin CLP150Plus	Q8 Goya NT 150		
-10 +25	CLP PAO	VG 150			Klübersynth GEM4-150N	Degol PAS 150 Degol GS 150	Enersyn EP-XF 150 Enersyn SG-XP 150		Renolin Unisyn CLP 150	Q8 ELGRECO 150		Carter SH 150
-10 +25	CLP	VG 220	Mobilgear XMP220	Omala Oil F220	KLÜBER GEM 1-220N	Degol BG Plus 220	BP Energol GX-XF 220	Meropa 220	Renolin CLP220Plus	Q8 Goya NT 220	Alphamax 220 Tribol 1710/ 220 Optigear BM 220	
-35 +30	CLP PAO	VG 220	Mobilgear SHC XMP220	Omala Oil HD 220	Klübersynth GEM4-220N	Degol PAS 220	Enersyn EP -XF 220	Pinnacle EP 220	Renolin Unisyn CLP 220	Q8 ELGRECO 220	Optigear Synthetic X 220	Carter SH 220
0 +40	CLP	VG 320	Mobilgear XMP320	Omala Oil F320	KLÜBER GEM 1-320N	Degol BG Plus 320	BP Energol GX-XF 320	Meropa 320	Renolin CLP320Plus	Q8 Goya NT 320	Alphamax 320 Tribol 1100 / 320 Optigear BM 320	
-30 +40	CLP PAO	VG 320	Mobilgear SHC XMP320 Mobil SHC 632	Omala Oil HD 320	Klübersynth GEM4-320N	Degol PAS 320	Enersyn EP-XF 320	Pinnacle EP 320	Renolin Unisyn CLP 320	Q8 ELGRECO 320	Tribol 1510/ 320 Tribol 1710/ 320 Optigear Synthetic A320 Optigear Synthetic X 320	Carter SH 320
-5 +40	CLP	VG 460	Mobilgear XMP460	Omala Oil F460	KLÜBER GEM 1-460N	Degol BG Plus 460	BP Energol GX-XF 460	Meropa 460	Renolin CLP460Plus	Q8 Goya NT 460	Alphamax 460 Tribol 1100 / 460 Optigear BM 460	
-20 +50	CLP PAO	VG 460	Mobilgear SHC XMP460 Mobil SHC 634	Omala Oil HD 460	Klübersynth GEM4-460N	Degol PAS 460	Enersyn EP -XF 460	Pinnacle EP 460	Renolin Unisyn CLP 460	Q8 ELGRECO 460	Tribol 1510/ 460 Tribol 1710/ 460 Optigear Synthetic A460 Optigear Synthetic X 460	Carter SH 460
	CLP	VG 680	Mobilgear XMP680		KLÜBER GEM 1-680N	Degol BG Plus 680	BP Energol GX-XF 680	Meropa 680		Q8 Goya NT 680	Tribol 1100 / 680 Optigear BM 680	Renolin CLP680

P.MC..P..



P.MC..R..



9.3 Lubricant fill quantity

The lubricant fill quantity is specified in your order document or on the nameplate.

The two gear units have a common oil chamber.

In case of a pivoted mounting position, refer to the oil fill quantity specified on the nameplate.

9.4 Sealing grease

The below mentioned grease types can be used as

- Sealing grease
- Bearing grease for the lower LSS bearings for gear units with Drywell sealing system

SEW-EURODRIVE recommends the grease types listed in table below for operating temperatures from – 30 °C to +100 °C.

Lubricating grease properties:

- Contains EP additives
- Hardness class NLGI2

Supplier	Oil
Aral	Aralub HLP2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Chevron	Dura-Lith EP2
Elf	Epexa EP2
Esso	Beacon EP2
Exxon	Beacon EP2
Gulf	Gulf crown Grease 2
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP2
Molub	Alloy BRB-572
Optimol	Olista Longtime 2
Shell	Alvania EP2
Texaco	Multifak EP2
Total	Multis EP2
Tribol	Tribol 3030-2

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Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84 reducom_sew@yahoo.fr

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 (17) 298 38 50 Fax +375 (17) 29838 50 sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca marketing@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 marketing@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 marketing@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530 P. R. China	Tel. +86 20 82267890 Fax +86 20 82267891 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141 P. R. China	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 + 1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE MEXIKO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Queretaro C.P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 ali.alami@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucureşti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-83554 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 sew@sew-eurodrive.sk http://sk.sew-eurodrive.com
	Žilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

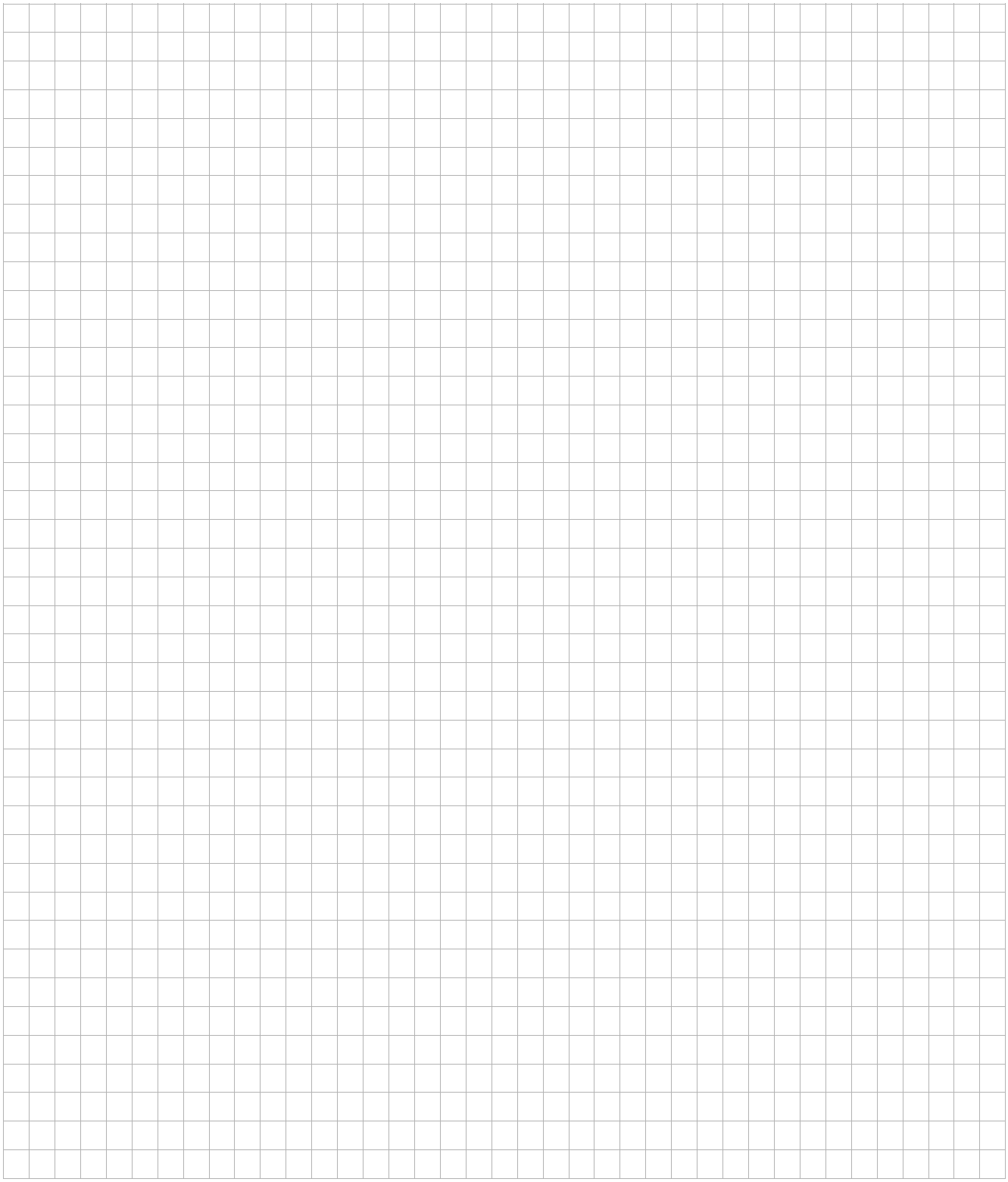
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 5, Rue El Houdaibiah 1000 Tunis	Tel. +216 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net



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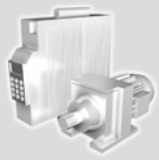

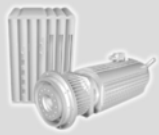

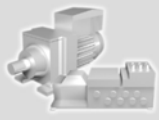

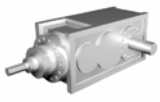

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